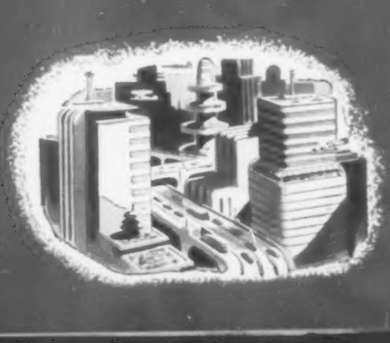
Vol. [illegible], No. 1

AUGUST, 1945

THE TOOL ENGINEER

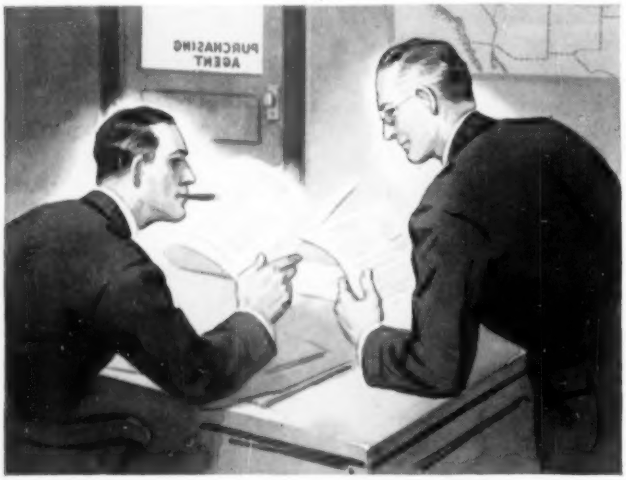
OFFICIAL PUBLICATION OF THE ASTE AMERICAN SOCIETY OF TOOL ENGINEERS



Machine Tools and Tool Engineering are the Keystone to Mass Production of War Matériel

Timely Tip for Tool Engineers

1 "Jim, we're going to need a lot of new equipment quickly—dies, jigs, fixtures, tools. Better check the tool engineers and make a list of what we'll need. I want to get the order in right away."



2 "When you place the orders for this equipment, I'd like to go on record as recommending Brown's tool shop. The quality and accuracy of their work is tops in my book."

3 "See this die? Accurate to a whisker . . . and that goes for everything we get from Brown. The answer's easy . . . they're Pratt & Whitney-equipped throughout—from die sinkers to Hoke blocks—and believe me, you can tell the difference."

There are no two ways about it . . . the better your shop is equipped, the better the quality of your work. That's why the man who is planning new tools for war use now (or for reconversion later) is wise to order them from a shop that has P&W machines, tools and gages. He can be sure of just that much better quality and precision in everything he buys. And usually Pratt & Whitney equipment turns out precision jigs and fixtures faster. Write to us for full information.

PRATT & WHITNEY

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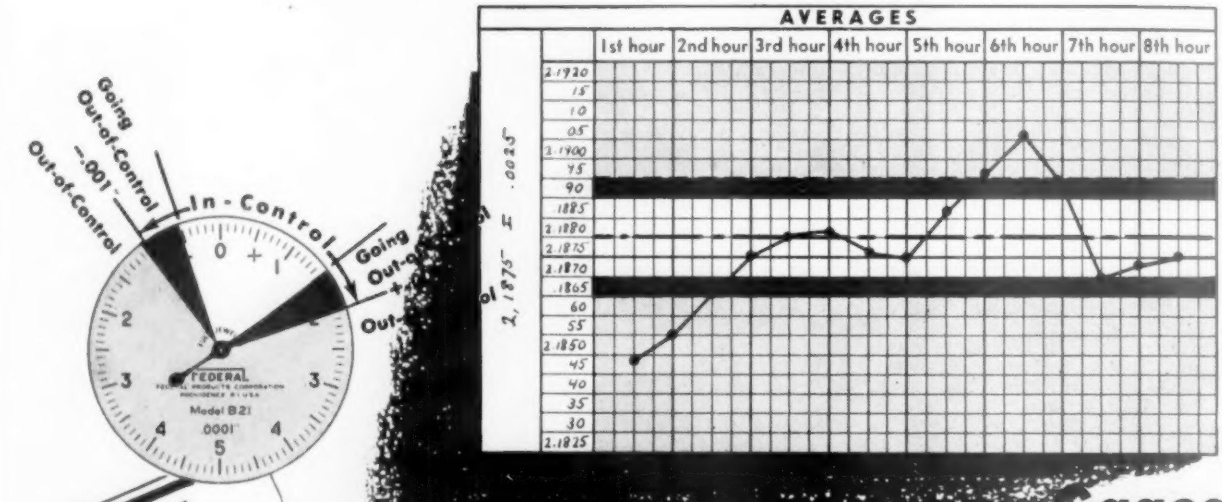
DIMENSIONAL

*QUALITY CONTROL

Locks the Barn Door BEFORE the Horse Is Stolen



Indicating Gages Obtain the Data and Keep Dimensions in Control . . .

This Fe... furnishes a simple a... method of *applying* Dimen... Quality Control with the detailed theory eliminated.

Statistical methods of controlling dimensions build quality into the product by employing control over the variables which exist during its production. Only by the use of Indicating Gages is it possible to obtain the necessary data at production. Fixed or old style Gages can't, because they do not tell *how much* the same dimension *varies* in each workpiece.

Much theory has been associated with Statistical Quality Control. Federal has prepared and furnishes a Primer — a simple practical method of applying this modern method of building dimensional quality into your work at production.

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* *Quality Control by Statistical Methods.*

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PUBLISHED MONTHLY BY

THE TOOL ENGINEER

AMERICAN SOCIETY OF TOOL ENGINEERS

VOLUME XV | AUGUST, 1945 | NUMBER 1

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American Society of Tool Engineers

National Headquarters

1666 Penobscot Bldg. Detroit 26, Michigan

The TOOL ENGINEER
Editorial and Advertising Offices:
500 W. Lafayette Blvd. Detroit 26, Michigan

The Tool Engineer is published monthly at 1666 Penobscot Building, Detroit 26, Michigan, in the interest of the members of the American Society of Tool Engineers. Advertising and Editorial departments are located at 550 W. Lafayette Blvd., Detroit 26, Michigan. Subscription is $2.00 per year. Non-members $6.00 per year. Copyright 1945 by the American Society of Tool Engineers. Entered as second-class matter February 8, 1945, at the post office at Detroit, Michigan, under the Act of March, 1879.

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Achievements of this nature cannot help but guide us to better serve the metal-working industries in the forthcoming after-victory manufacturing era.
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Coated Abrasive Products produced for you by "CARBORUNDUM" have been given names that indicate their use in *your* plant. For instance, in the woodworking industry products you use will be identified as "Drum Paper," "Cabinet Paper," "Finishing Paper," "Belt Paper," etc. . . . or, if your business is in the metalworking field, "Industrial Cloth" and "Metal Cloth" would be the products you require.

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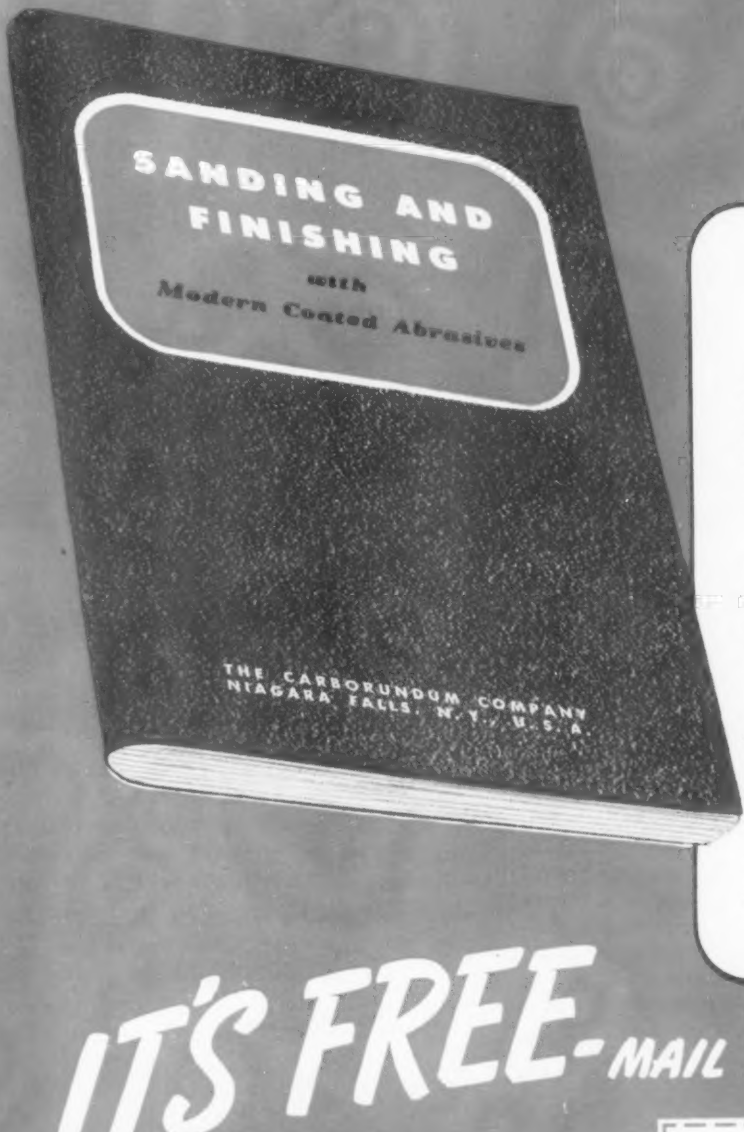

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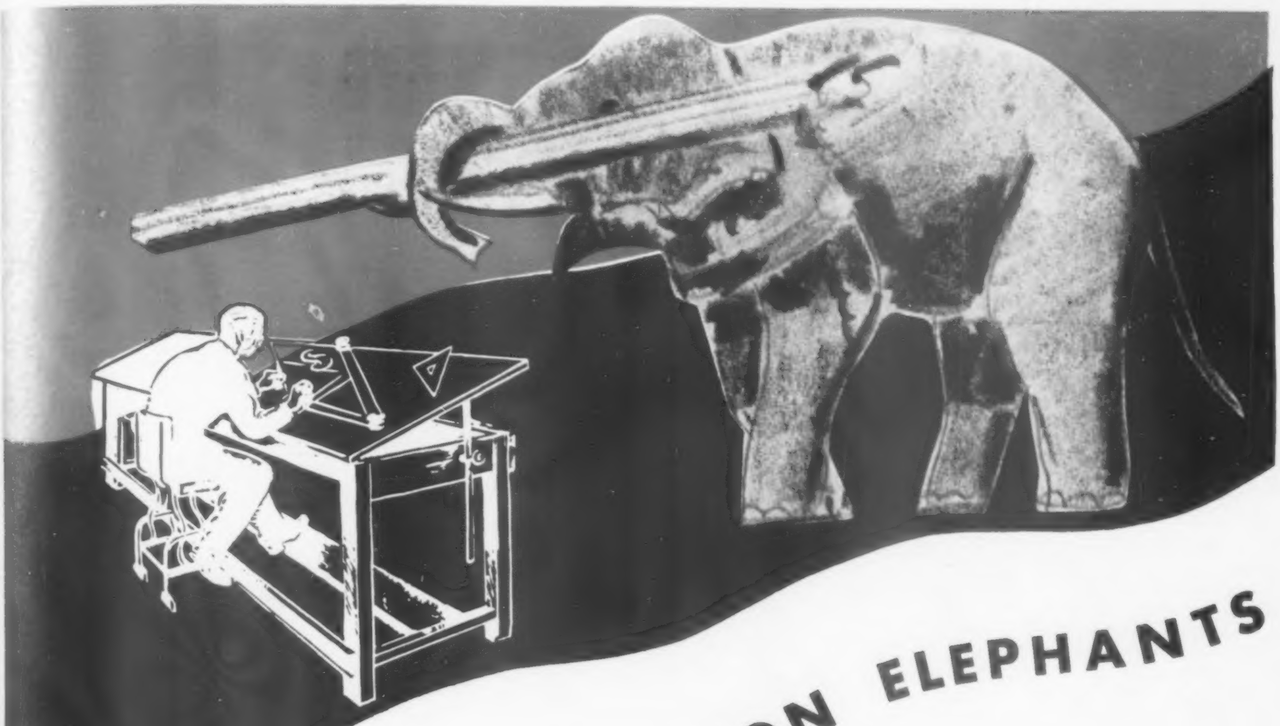

NEW TOOLS FOR IRON ELEPHANTS

A "never forgetter" weighs as much as sixty men. It is the machine tool of the animal kingdom. Like many machines it would be nearly helpless without its one *special tool*—a trunk which contains 40,000 separate muscles and can pick up a peanut or a ship's mast.

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Van Norman

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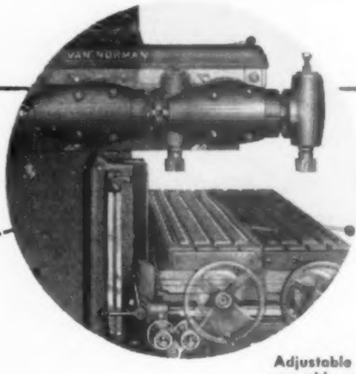
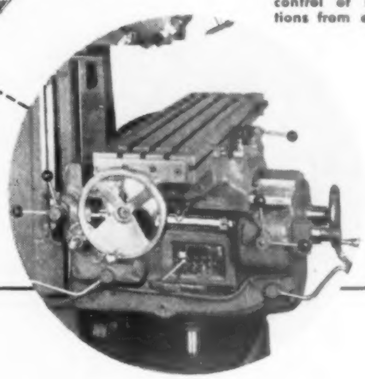
No. 36 RAM-TYPE MILLER Table 58" x 13". 18 speeds: 30 to 1500 rpm. 18 feeds: ⅜" to 32". Range: 35" longitudinal, 12" cross, 22¼" vertical.



Adjustable cutterhead and movable ram in combination with the saddle cross feed provides maximum work capacity and milling versatility.

Front and Rear control of both hand and power feeds gives operator complete control of milling operations from either location.



Adjustable Cutterhead, Movable Ram and Front and Rear Operator Controls Eliminate Idle Machine Time, Reduce Worker Fatigue and Increase Production

Are the machine tools you are buying today versatile enough to meet the uncertain, changing conditions of the future?

Van Norman Ram-Type Milling Machines will meet your present milling problems and cut your reconversion problems in post-war retooling. Why? Because these extremely adaptable millers enable you to perform horizontal, vertical and angular milling on one machine by simply positioning the adjustable cutterhead. This Van Norman feature alone increases machine production and cuts costs by eliminating idle machine time by as much as 50%. It also permits operators to carry most milling jobs through to completion without disturbing the original workpiece setup.

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Springfield 7, Mass.

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. . . AND GET IMMEDIATE DELIVERY FROM STOCK!

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SUPER TOOL COMPANY

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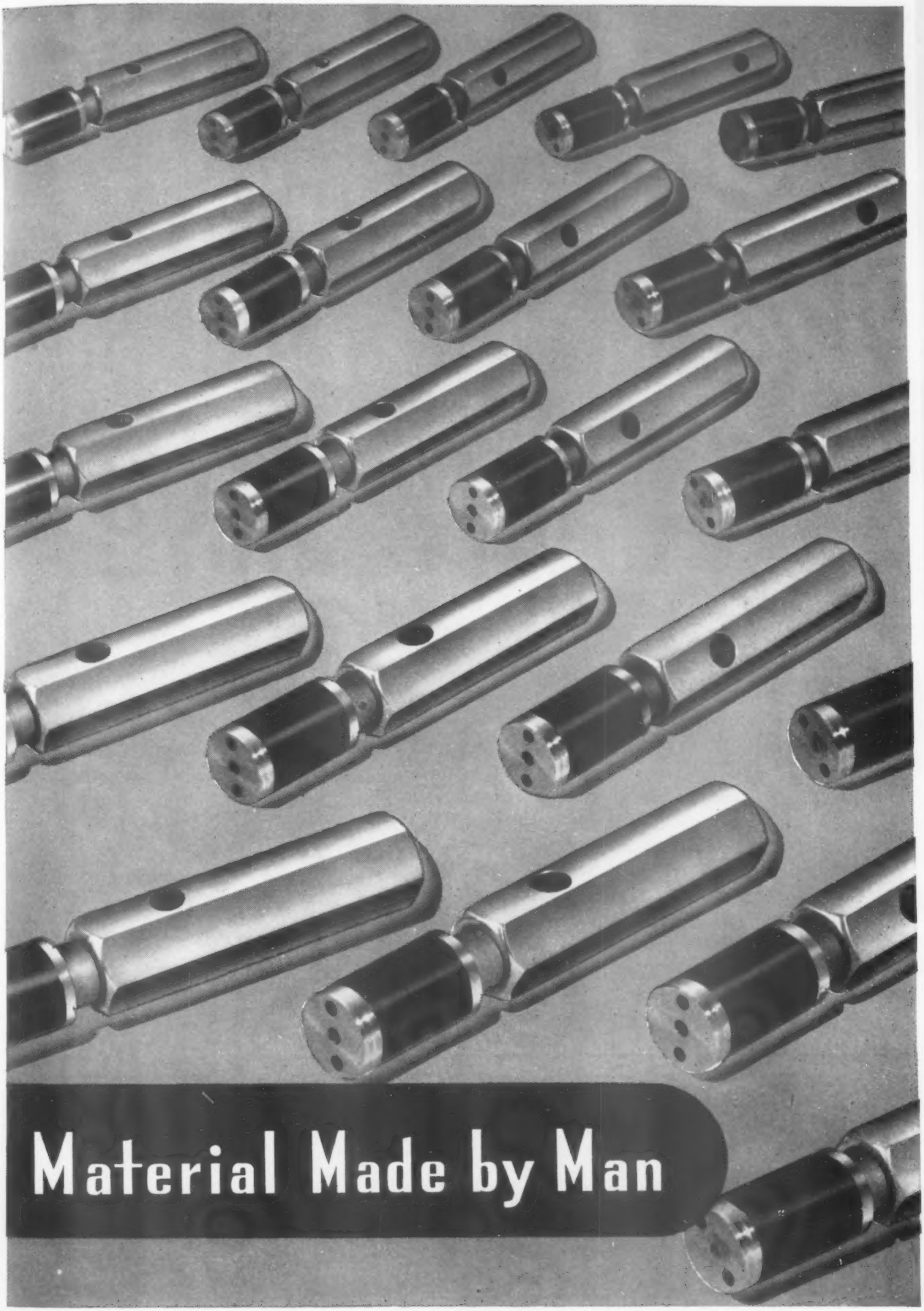

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The New ASTE Constitution and By-Laws

As this is written, all the votes have not been counted, but it is obvious that the membership of the ASTE has decided almost unanimously in favor of adopting the proposed new Constitution and By-Laws.

To those of us who had an opportunity of sitting in on many of the almost countless hours, days and nights—month after month—of drafting these documents, that vote is ample compensation.

For their adoption will bring an automatic return to the Democratic principles on which our Society was founded. Actually, the new Constitution is older than our present one. What had happened was that the ASTE's tremendous growth had made *practical* operation of the Society on democratic lines almost impossible. In the early days, for instance, there was a Director from each Chapter. As the Chapters increased in number, it became necessary to group Chapters into regions to keep the Directorate workable. Since a large Directorate could not meet often, it became necessary for an Executive Committee to perform many of the Directorate's legislative duties.

Under the new Constitution, each Chapter will again be represented individually in a House of Delegates. That House will elect the Directors. That House can initiate legislative action directly by recommendation to the Directors which IT elects. There is no Executive Committee, as such. Officers of the Society have only administrative and not legislative powers. Restrictions on Directors being re-elected are removed, giving the House free choice, and election is for one year only—permitting changing of Directors when the House so chooses.

Moreover, in addition to returning direct voice to the Chapters, any group of 20 members anywhere can—by petition—nominate a director for voting on by the House. Again, freedom of action is insured by the fact that no officer of the Society may preside over meetings of the House of Delegates.

One other factor should be mentioned in connection with the new Constitution: its designation of different classes of membership. The founders of the Society could not anticipate that the value they wanted to set on *full* membership in the ASTE could decline as the result of loose and varying terminology in Industry. Under the new Constitution, full membership in the ASTE is restricted to those actually qualified for it. Those in process of qualifying may still participate in and benefit from Society activities through other classes of membership but are restricted from full membership until actually qualified. Thus, the new Constitution neither lets down the bars nor closes the gate completely. It attempts to do what the founders aimed at—raise the standards of the Tool Engineering profession and make ASTE Membership of equal or greater value than that in any other professional Engineering Society in the World.

No document is ever perfect, of course. We hope that the new Constitution and By-laws will stand the test for many years. But, if changing time and conditions should in themselves again alter the interpretation of the sound basic principles which both the original and the new Constitutions were designed to interpret, then it would be far better to change the documents rather than allow changing conditions to affect the basic aims and principles of the ASTE.

This latter, the new Constitution is designed to prevent.

C. V. Briner,
President, 1945–46

Notice of Adoption

To all Members of the American Society of Tool Engineers:

The Chairman of the Tellers Committee, Past President Joseph A. Siegel, has submitted to I. F. Holland, Chairman of the National Constitution and By-Laws Committee, the final report and computation of the ballots cast relative to adoption of the Revised Constitution.

This report has been filed with your National Secretary by Mr. Holland and discloses that the Revised Constitution has been adopted by a large majority.

The Revised Constitution became effective July 23, 1945, the date of the report of the Tellers Committee.

It is suggested that each Chapter Chairman, Chapter Secretary and Chapter Chairman of the Constitution and By-Laws Committee should make a thorough study of the new Constitution, in order that they may be fully informed as to its requirements concerning the activities of the National Organization and the specific directions governing the conduct of Chapters and Chapter Officers.

August 1, 1945

AMERICAN SOCIETY OF TOOL ENGINEERS
A. M. Schmit, National Secretary

Fred M. Burt

One Hundred Million Die Castings

Outline of tooling and production methods responsible for tremendous war output with maximum quality.

THE term "Die Casting" originated in England, where it still means a casting made from a permanent die—i.e., a casting which may be merely poured. The Germans had a better name for it—"Spritzgruss," which means *squirt casting*. And it really is metal squirted into the die under pressures varying from 200 to 1,500 pounds per square inch.

Without this technique for the production of small aluminum and zinc alloy die castings, the Die Casting Department of the Cannon Electric Development Company, Los Angeles, California, would have found it virtually impossible to have supplied some 100,000,000 die castings since war demands made it necessary, in 1941, to adopt mass production methods. These castings are major parts of the great variety of Cannon electrical connectors, or plugs, extensively used in aircraft and in many other units vital to the war effort; plugs with an infinite number of present and future uses in the civilian world.

Tooling a Major Factor

A major factor in increasing this production to the present output of about 800,000 castings per week, with two shifts, has been *Tooling*, with its systematic, intelligent development and use. However, this article will be devoted principally to present practices, without going into the details of the development and redesigning of the machines, dies and other tools, which has materially boosted production while, at the same time, cutting off the third shift and eliminating helpers, previously used on many of the machines.

Fred M. Burt **was born in Iowa, attended college in Ohio and W. Va. Devoting himself to industrial, production and sales engineering, he specialized in promoting information in the technical fields. He is author of over 300 technical articles published in leading magazines during the past 20 years.**

One "gooseneck" and 20 modern, cold chamber die casting machines are in constant use. Most are Harvill machines, with many Cannon modifications, but six are Cannon built. The dies have been constantly improved under competent supervision and designs have been altered to provide the maximum number of cavities to be filled with each "shot." From two to 15 castings are now made per shot, depending upon the size and design of the part. Rejects are kept at a minimum by close technical and production controls.

The Die Cast Department has three divisions:—the remelt, die-casting, and flash-breaking. In the die-casting, the one gooseneck machine is used exclusively for zinc alloy die castings. The gooseneck is submerged in the zinc alloy in the melting-pot which is an integral part of the machine.

The zinc alloy, which conforms to Zamak Specification No. 3, is injected from the pot by a plunger, with a pressure not to exceed 300 to 400 psi. The zinc has a higher mechanical strength than the aluminum alloys used, but weighs more than twice as much and has cold-flow characteristics not as good as that of the aluminum alloys. As most of today's production of Cannon plugs is for aircraft, this weight factor makes aluminum preferable.

Since, however, the zinc alloy is not chemically as active as the aluminum, is cast at a lower temperature, and the iron pick-up from the turbulent drawing through the gooseneck does not have the deleterious effect it would on aluminum, the gooseneck machine may be used with zinc. There is less abrasion on machine parts and dies, therefore the zinc dies last longer than those used with aluminum.

The cold-chamber machine consists of a hydraulic cylinder, a ram and an injection cylinder. (See Fig. 1). The aluminum is melted and held at a temperature of from 1200 to 1300-degrees F. in an entirely separate gas-fired holding pot with a refractory lining. This keeps the aluminum out of contact with metal except during ladling and injection, eliminating iron pickup. Hand ladling is used, with exact amounts regulated by the size of the ladle and experience of the operator. This makes for a somewhat lower casting

FIG. 1. Die casting machine, with operator applying oil spray to die prior to next shot. Melting pot at right, concave protecting deflector at back of machine.

FIG. 2. At right, compressed air ingot breaker. Center background, reserve oil-burning units, for use under pots should gas be cut off. Note good "housekeeping" as evidenced by glove bins and bag of oil absorbent, to be scattered on floor to absorb oil.

rate which is offset by better castings, fewer rejects and lower maintenance costs.

The two aluminum alloys used fit AN specification AN-QQA-366, Amendment 4, classes 13 and 85X. The 85X is claimed to be the best all around aluminum die casting alloy, although not having as good flow characteristics as the class 13. However, it does not adhere to the die cavity and cores as much as the 13, which makes it possible to readily eject the castings from the dies without excessive, plastic deformation.

Also the use of the 85X—and modified methods—has made it possible for this department to produce large quantities, with few rejects, of aluminum castings with internal threads, over 24 to the inch—a rather uncommon practice—and wall thicknesses of .06" are also common. High speed machining, tumbling and shearing operations are much easier with the use of the 85X than with the 13.

The dies, mostly multiple cavity, are precision-built from high alloy steels to withstand tremendous impact loads. The dies are made in two sections which come together at the vertical plane-surface, "parting" line. The front of the die is affixed to the front plate or platen of the machine on the cold-chamber side where the molten metal is ladled in.

The movable or ejector portion is arranged to be pulled away from the front portion when the die is opened, and usually contains most of the cavity which gives the casting its shape. When the die is closed, the ejector plate and movable cores are held motionless. When the die is opened after the casting injection, the ejector plate is advanced so that the pins which it carries, projecting through the ejector portion to the die cavity, can force the casting out of the cavity and off the fixed core. This ejection movement is actuated either manually or automatically, depending on the machine and die.

The cores of the dies used for the internal threading are threaded to give form to the casting and, when the die is opened, the pressing of a button starts them to turning. This reams the threads of the casting and ejects it by screwing it right off.

The evolution of the dies now in use has followed a program aimed at using as many cavities as is practicable for the design of the casting as related to the capacity of the machine. The greater the number of cavities in the die, the greater the production of castings per shot—that is self-evident. Some castings, however, are of such sizes and intricacies of design that they do not lend themselves to multiple cavity production.

Design with Discretion

In designing such dies, the tool engineer must be acquainted with shrinkage characteristics of the steel component of the dies and of the metal to be cast, and with proper coring, the most effective gating and venting, and location of die cavity relative to the sprue orifice as well as with incidental design characteristics. This is an experience which can hardly be gained except empirically.

Many of the Cannon dies have means for automatic core operation as well as automatic ejection. In most cases the gate is removed at the same time the casting is sheared, by punch press, in the flash-breaking division.

The ingots of virgin metal are broken into smaller sections on an ingot breaker (See Fig. 2) for quicker melting in the pots so that they will not tend to overly reduce the temperature. The specified virgin and remelt metal (generally in

FIG. 3. **Electronic timer panel, controlling timing of oil machines. Electronic units easily removed for servicing.**

FIG. 5. **Die Storage and Maintenance Service Room. Note castings from last previous shot attached to dies.**

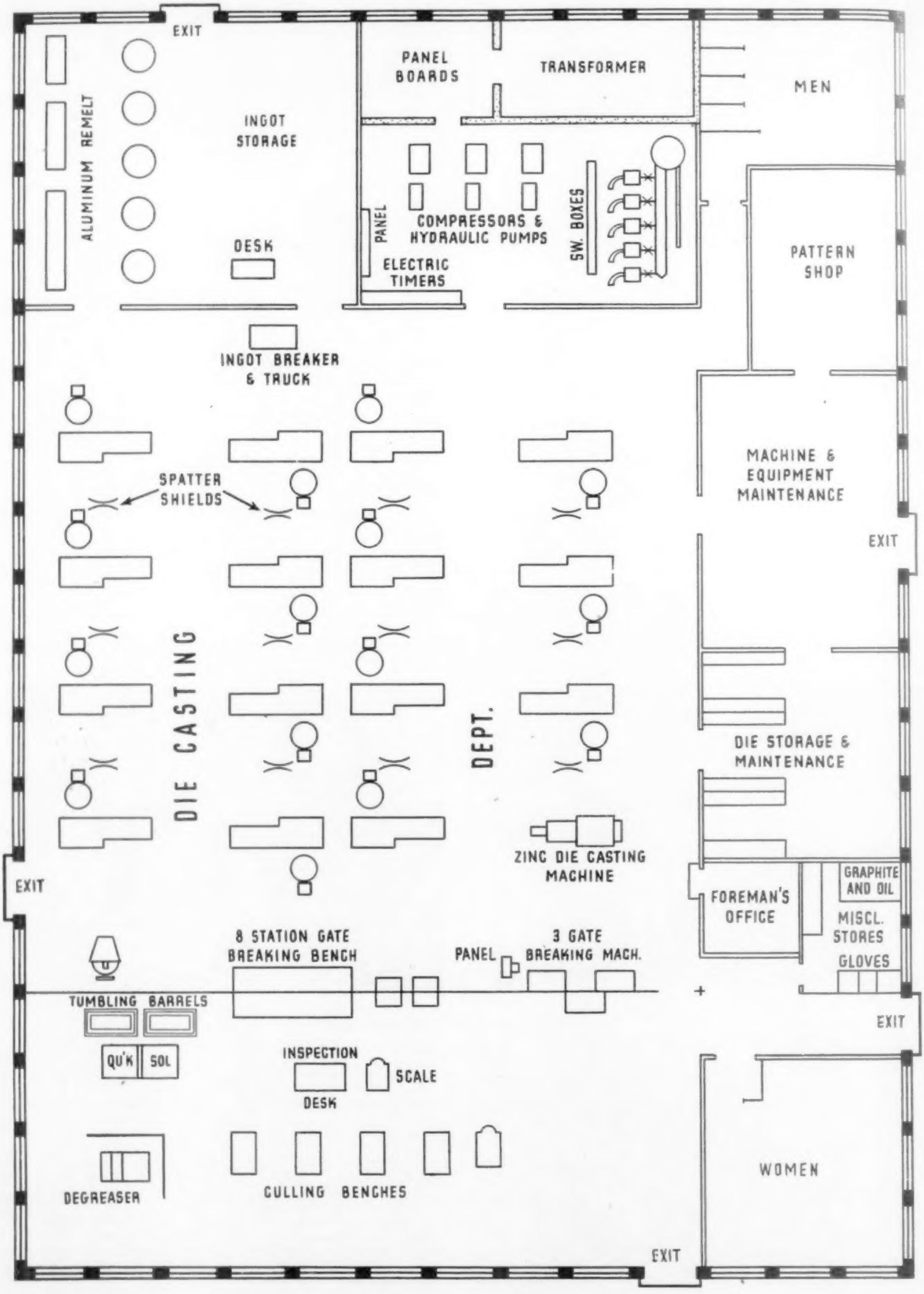
Material: Aluminum Alloy CANNON MANUFACTURING CORPORATION **Data: 1945**

Use: Die Cast ANALYSIS REPORT **Report No. XYZ**

Heat No.	Alloy Type	% Al	% Cu	% Si	% Zn	% Mg	% Mn	% Ni	% Sn	% Pb	% Fe	% Cr C	% Mo	Others
1-2-3-4-5 & 6	Not Run													
Lots 1 & 2	KK6 Remelt	Rem.	3.43	8.61			.32				.89			
Lots 3 & 4	KK6 Remelt	Rem.	3.50	8.33			.32				.95			
Lots 5 & 6	KK6 Remelt	Rem.	3.56	8.83			.33				.89			
Lots 7 & 8	KK6 Remelt	Rem.		8.58							1.03			

FIG 4. **Typical analysis report on lots of Remelt.**

By______________________



Schematic Die Casting plant layout. Electric timers, shown in pump room, may also be adjacent to foreman's office.

weight proportions of one virgin to two or three remelt) is stacked on the pots, by delivery men on each shift, to make it convenient for the operator to add it to the molten mass as indicated.

Every provision is made so that the operator may devote his time and energy to producing castings. He uses his left hand to actuate a control which brings the two sections of the die tightly together. Then, with his right hand, he dips a ladle full of molten alloy from the pot and pours it into the aperture at the top of the cylinder encasing the hydraulic piston, operating under a pressure of 400 lbs. psi., the advancement of which forces the metal into the die cavities.

The cylinder head is approximately six inches in diameter but the actual plunger injecting the metal has only about one-twentieth this face area, which allows for a multiplication of available pressure to above 8,000 psi. It is only with these high pressures that dense, homogeneous body-structures of aluminum alloy die castings can be obtained.

Injection is started by the pressing of another control button, and is continued and timed by an electronic timer. This is a remote control with the electronic timers for all machines grouped together in a panel behind a locked, glass door at one end of the department next to the office. (See Fig. 3). These timers are all Cannon designed and built. The dial of the timer is calibrated and the pointer is set for the reading or time cycle called for on a Die Record Card for that particular part.

These timings are constantly analyzed with relation to the quality of the casting produced and other factors involved, so that the time of injection and setting of the aluminum, before the opening of the die, may give the best and most uniform castings.

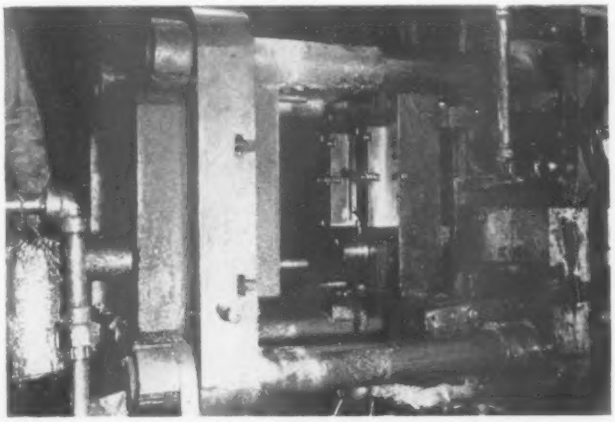
From the time of starting the injection the operator has no control over the machine until it opens for removal of the casting. The control panel is kept locked with the settings made by, or under the close control of, the foreman in charge.

Each pot holds about 70 lbs. of molten aluminum, and this mixture of virgin aluminum and remelt has a chemical composition which has been previously defined by the Metallurgical Laboratory. Each pot has throttling controls for thermal adjustment set by the supervisor for the casting qualities desired. The pot and thermocouple sheath are both refractory-coated to reduce metallic contamination. An additional control of valve adjustment on the hydraulic piston line-flow regulates the speed of the injection plunger. The setting of this is also carried on the Die Record card.

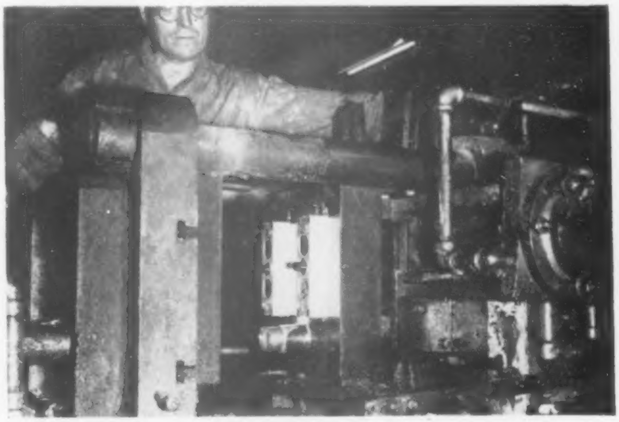
When the castings are removed from the dies they are tossed into large steel tote boxes, mounted on wheels, and sent to the gate break and flash removal section to separate the castings from the gates, cores and sprues. The latter are placed in properly designated storage bins according to the class of alloy.

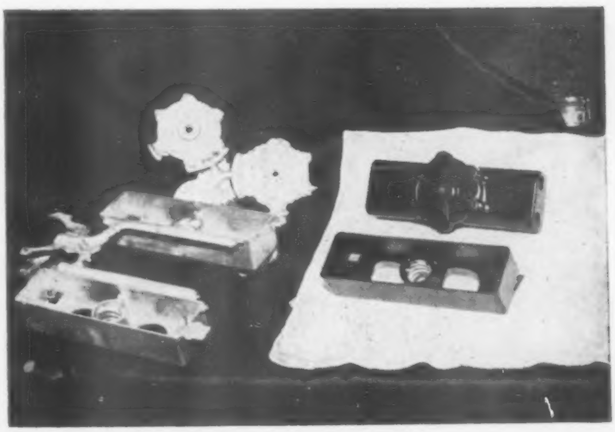
The flash removal is done with shearing dies or kick presses whenever possible, with small parts being trimmed in multiple. Some excess flash, not thus removed, is subsequently removed in tumbling barrels. At regular intervals, the scrap material is sent to the melting room with a card recording the type of alloy. This is subsequently melted and

Two-cavity battery housing die just before closing. This is one of the largest castings made at Cannon. Note ejector pins.

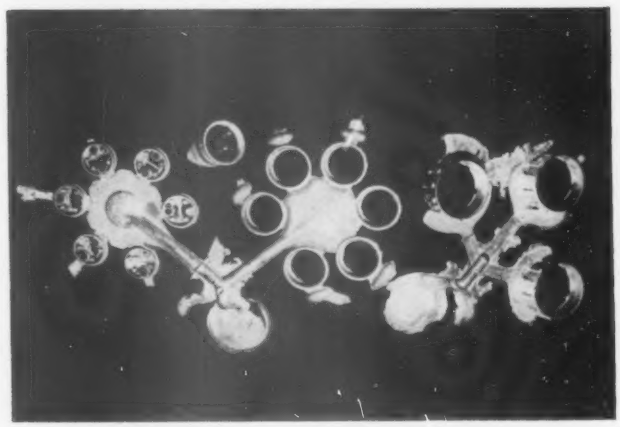


Complete battery housing casting just before ejection. Operator is actuating control for automatic ejection, rising hydraulic cylinder at right center.





Rough castings, used in the battery housing as they come from the machine. At right, completed unit including plastics part. Note the internal threads.



Typically, internally threaded, 3 cavity casting at left. At right, good example of multi-cavity casting.

refined in accordance with recommended procedures for the given type of alloy.

The eight melting pots, gas-fired, operate under prometric (Brown) control at about 1200-degrees F. Each has a capacity of about 300 lbs. and the melting capacity of all furnaces is about 10,000 pounds of aluminum daily. They are constructed to contain clay-graphite Turcod crucibles, to eliminate the contamination that would come from using iron pots. After being properly degassed and refined with the sludge skimmed from the top, the metal is ladled out and poured, manually, into refectory-coated ingot molds. The ingots are separated into heats, depending on the furnace number and refining sequence. All Metallurgical Laboratory reports are based on these heat numbers.

Laboratory Control

Daily reports are made on the condition and analysis of the alloys remelted. Files are kept of all analytical test reports from the refiner of the virgin ingot so as to correlate the analysis of the remelt metal with that of the virgin for guidance in blending to obtain uniform chemical characteristics in the casting.

The chemical analyses of the common die casting metals—aluminum and zinc—require analyses on the main alloying constituents as well as on the minor impurities. The latter frequently are great troublemakers since even very small percentages may cause a failure in the completed part while in operational use.

Frequent chemical checks are made on finished castings to maintain a running record of the purity of the end product as well as of raw material. In the zinc alloy, the common alloying elements are copper, aluminum, cadmium, tin, iron and lead. The Zamak specifications require that impurities do not exceed 10%, in some cases not over .01%.

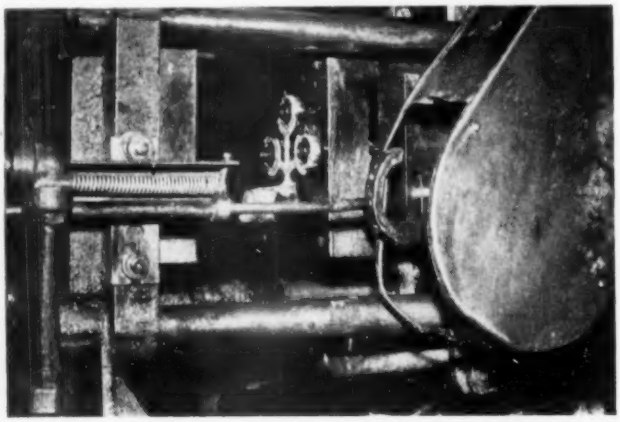
Aluminum die cast alloys are tested for silicon, copper, iron, zinc, magnesium and manganese. The copper must be kept in the low range to maintain good corrosion resistance on the finished product. Silicon must be maintained around 8% to allow for maximum machinability, good ductility and improved casting characteristics. (See Fig. 4 for typical Analysis Report on Aluminum Alloy.) Micrographs of the aluminum alloy are taken to check the degree of modification of the silicon within the alloy.

Physical properties most frequently checked are tensile strength, psi, yield strength psi, and Rockwell or Brinell hardness, according to A.S.T.M. recommendations. Results of all tests are kept in laboratory files with copies sent to production supervisors for their guidance.

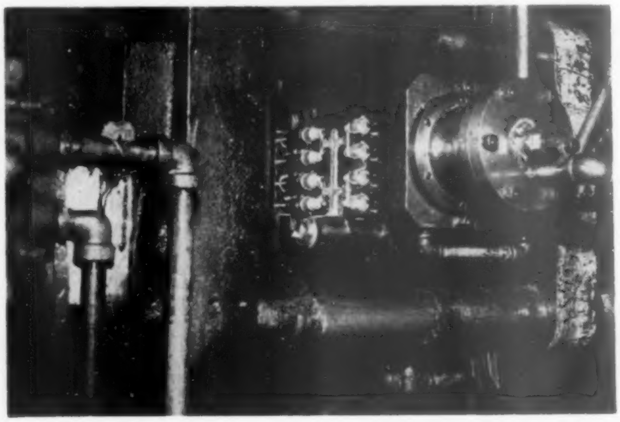
Other laboratory research work is designed to (1) develop new types of alloys to facilitate casting; (2) improve and develop finishes for the aluminum and zinc castings to increase corrosion resistance and improve the product generally, and (3) lubrication control on die cast molds to facilitate casting ejection.

When a die is removed from a machine after completing a run, the casting from the last shot fired is wired to it as a record of its performance at this time. It is then taken to the adjacent die storeroom where it is put through a degreaser and placed on the spot in the shelves designated by its serial number. Any reworking required before its next term of service is done either here or it is sent to the Tooling Department or Maintenance Service, as shown in Fig. 5.

Threaded casting at start of ejection. Note threaded cores which turn to ream and eject castings, in the center of each cavity.



Eight cavity die and casting in large machine, with manual side ejection.



Operator pouring remelt into ingot molds. Note cool air, ventilating ducts, above. Remelt ingots at right.

Operator emptying congealed ingots from molds. In rear, three 300 lb. capacity, gas fired pots, with pyrometers for control.

By Dr. A. O. Schmidt

Power Requirements In Milling

Calorimetric tests basis of formula for determining horsepower requiral in carbide steel milling.

THIS article gives a description of the calorimetric equipment designed to measure heat generated in the chips during cutting operations in an investigation of radial rake angles in face milling. A series of tests with various feeds was run on a Milwaukee 2K Vertical milling machine using the following cutting speeds: 194, 277, 428, 526, 641, 780, 960, and 1180 fpm. The relationship between these tests can be determined with the aid of a graph, Fig. 3, which permits the evaluation of net horsepower, horsepower per cubic inch of metal removed per minute, and chip temperature rise from the maximum calorimeter temperature rise. Experiments in which the total power requirement of identical cuts was measured show that the percentage of power going into the chips remains constant for the different rake angles. Derivations of formulas and sample computations are included.

Power at the cutting tool may be measured by employing various methods, each distinctively different from the others. A device commonly used and sufficiently accurate for production setups is the wattmeter which measures electrical power input to the machine tool. Discrepancies caused by varying drive motor efficiency, lubrication and friction factors in gears and bearings render this method unsatisfactory for precise determination of power required by the cutting tool.

Dr. Alfred O. Schmidt **is in charge of Metal Cutting Research, Kearney & Trecker Corporation. He has lectured on mechanical engineering at Marquette University, on production engineering at Colorado State College, and has done post graduate work at University of Michigan under Prof. O. W. Boston. He was previously mechanical engineer with the Carl Zeiss Optical Works.**

To eliminate these sources of error, dynamometers which measure power at the cutting tool have been designed. Such instruments require expert design and calibration and must be checked frequently. Sources of error relatively impossible to exclude in investigations such as this are variations in workpiece material, which is actually never homogeneous, and changes in cutting edge angles caused by wear which begins as soon as cutting starts.

Although the calorimetric method is well known and widely applied in engineering, little use has been made of the method heretofor, in the investigation of metal cutting operations. Previously the author had developed and tested a thermal balance method for evaluation of power in a drilling operation (1)*. This was done with the cooperation of Professors Gilbert and Boston of the University of Michigan. In these tests a calorimeter was mounted on an accurately calibrated drill dynamometer. Cutting action of the drill caused a temperature rise in the calorimeter which was easily measured. From the torque and thrust recorded on the dynamometer, the power consumption at the cutter was determined. This result was in very close agreement with the power as computed from calorimetric data taken simultaneously.

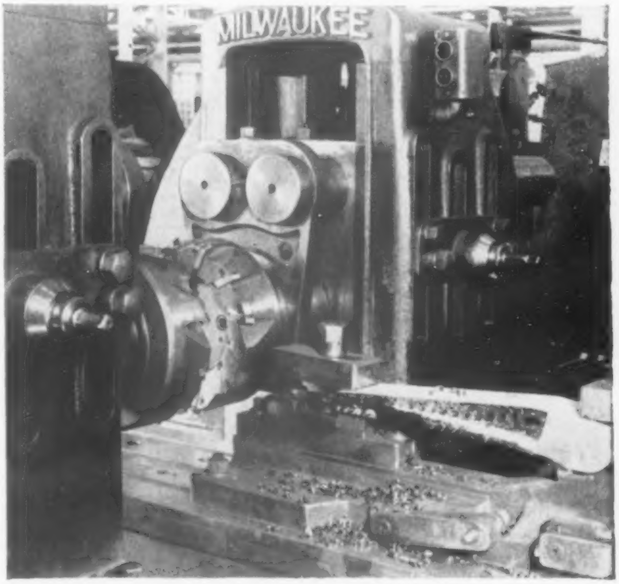
* Numbers in parenthesis refer to the Bibliography at the end of the article.

Calorimetric Method Chosen

When an investigation of high-speed milling was initiated by the Kearney & Trecker Corporation, a calorimetric method was chosen as the means for obtaining cutter power data.

In a previous paper (2) a method and apparatus for the thermal analysis of high-speed milling was reported. Both the size of this apparatus and the maximum spindle speed of the machine limited the cutter to a diameter of 2 inches and a maximum cutting speed of 780 fpm. Since the results gained from the investigation (3) carried out with this type of equipment could easily be duplicated at any time and also were helpful in the improvement of cutter design, a further continuation along this line was considered desirable. In order to have a close correlation between the tests performed with a 2 in. calorimeter, the new calorimetric setup was made similar to the previous one with an increase in size. This enlargement permitted the use of 3-in-diam cutters and a maximum cutting speed of 1180 fpm. The apparatus made possible the acquisition of data with which the interrelationship of cutting speeds, feeds, tool angles, and workpiece material could be further determined. (4)

FIG. 1. **15° positive Radial Rake Milling Cutters Used in a Roughing Operation. The cutters are provided with a narrow 10° negative radial rake face right at the cutting edge. Material being cut, S.A.E. 4340 forging, annealed, 200 Bhn; feed 26" per minute.**



ACKNOWLEDGMENT: Grateful acknowledgment is made to Messrs. J. R. Roubik and J. P. Bunce of the author's company for help in carrying out these tests and checking the manuscript.

The principle of operation of the apparatus is the first law of thermodynamics: "When work is transformed into heat or heat into work, the quantity of work is mechanically equivalent to the quantity of heat."

Several thousand tests revealed that this simple calorimeter is reliable and that the power required at the cutting edges of a milling cutter can be evaluated with accuracy. Only the heat in the chips is used in power determinations and it has been found to be a good indication of the actual power consumption. The chips fall into 150 cc of distilled water which is kept circulating in the calorimeter by an electrically driven agitator. The temperature of the water before and after cutting is recorded and used in the computations for power and chip temperature. The cutting time for each test is very short and errors caused by heat losses are thus kept negligible. Each test is started with the calorimeter, water, and equipment at room temperature. Care is taken to avoid any sudden temperature changes in the room during the test.

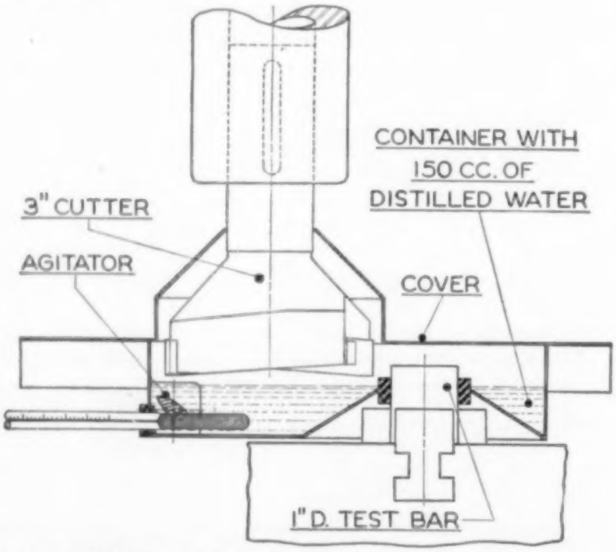


FIG. 2. **Calorimetric Test Set-up.**

The test equipment is shown in Fig. 2. Cutters with adjustable tungsten-titanium carbide blades are used. Their design is similar except for the radial rake angle which, for various tests, has one of the following values: 30, 15, or 6 deg positive, O deg, 6 or 12 deg negative. The test bars are 1 in. diam and are held in a three-jaw chuck which is fastened to the table of the milling machine so that its center line is coincident with that of the cutter. The lower part of the calorimeter is mounted over a short piece of rubber hose which is fastened around the test bar and holds the apparatus suspended in the air. A thermometer calibrated from —20 to 120 F is used for the temperature measurements and is held by a rubber grommet in a hole at the side of the calorimeter. An agitator driven through a flexible shaft at 2000 rpm by a 1/20 hp electric motor serves to circulate the water and thus prevent false temperature measurements.

Round Test Bars Preferable

The test bar is located in the three-jaw chuck with a depth micrometer and the depth of cut in all tests is set at 0.125 inch. The table stops are adjusted so that they will disengage the table feed as soon as the cut is completed.

Round test bars are used even though they will offer a different angle of entrance to the cutting tip for each revolution of the cutter. When using rectangular test bars of the same cross-sectional area no difference is found in the power requirements. Only a few calorimetric tests are made with each individual cutter, removing 0.3 cu. in. of chips with each cutting tip, and wear on the cutter is minute in all cases. Care is taken to have the cutter ground and checked accurately. It is also found that the two-lip cutter produces a more balanced cutting action and permits simultaneous testing of two cutting tips. However, a flycutter, or any multiple-toothed cutter, could be used just as well.

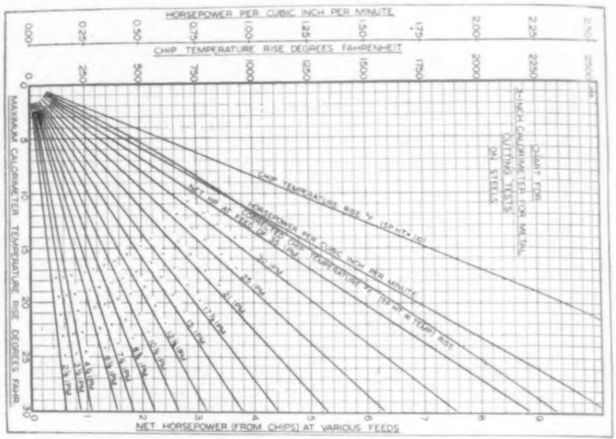


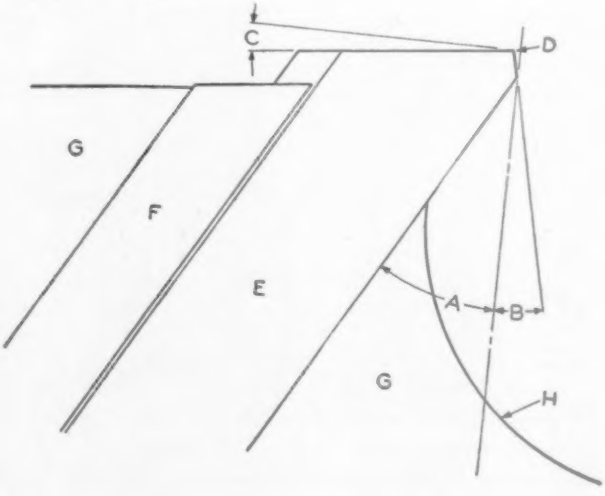
FIG. 3. **Calibration Chart for Calorimetric Cutting Tests.**

Pipettes are used to measure 150 cc of distilled water which goes into the calorimeter. The calorimeter temperature is read before the test and at its maximum, about 4 sec after the cut has been finished. During this time the agitator is kept running. The water does not come in contact with either the test bar or the cutter, and the power measurements taken with this equipment represent only the power which is converted into heat in the chips.

Correction for Heat Losses

As in other calorimeters, the maximum observed temperature is less than the theoretical maximum which would have been reached if no heat had been lost by radiation, convection, and conduction during the experiments. However, since the time of cutting is in most cases only a few seconds, these losses are very small. Only for tests at very low speeds and feeds was it found necessary to make adjustments for heat losses. These losses were determined from a cooling curve by computing the rate of cooling.

FIG. 4. **Schematic Diagram of Cutter Tooth with 12-Deg Negative Primary Radial Rake and Positive Secondary Radial Rake Angle. A, positive secondary radial rake angle; B, negative primary radial rake angle; C, peripheral clearance angle; D, cutting edge; E, inserted solid carbide blade; F, hardened wedge; G, face mill body; H, chip clearance surface.**



For tests above 200 fpm cutting speed no corrections were made because the computed error was smaller than the permissible reading error of 1 percent of the actual temperature rise.

Derivations of Formulas and Discussion of Test Results

In each test a 1-in. diam. steel bar is milled to a depth of 0.125 in., 0.0982 cu. in. or 0.0278 lb. of metal being removed. Assuming the specific heat of steel as 0.110, the total water equivalent of the calorimeter, 150 cc of water, and the chips is 0.3600 lb. which value is used in the following computations.

The net horsepower expended in the chips is the mechanical equivalent of the heat increase in the calorimeter divided by the cutting time. Therefore,

$$\text{Net hp} = \frac{(\triangle T)\ (\text{total water equivalent})}{(\text{Cutting time, minutes})\ (42.44\ \text{Btu/min})}$$

where

$\triangle T$ = Calorimeter temperature rise, deg F.

1 hp = 42.44 Btu/min

Since the length of cut is 1 in., the cutting time may be expressed as the reciprocal of the feed rate in inches per minute or $1/F$. Then

$$\text{Net hp} = \frac{(\triangle T)\ (0.3600)}{(1/F)\ (42.44)}$$

Solving this equation, with $\triangle T$ as the independent variable, for each feed used,

$$\text{Net hp} = K_F \triangle T \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 1$$

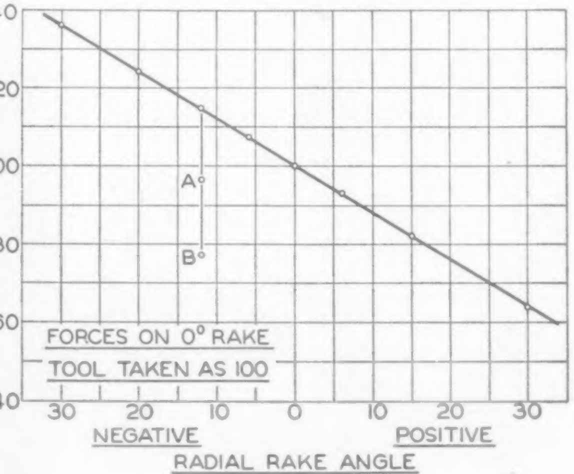
where

$$K_F = \frac{0.3600}{(1/F)\ (42.44)}$$

a constant depending upon the rate of feed in inches per minute. In the following table are values of the cutting time, $1/F$, and the constant, K_F, for typical feeds,

Feed ipm	K_F	Feed ipm	K_F
2½	0.0212	12½	0.1060
3½	0.0297	15	0.1272
4¼	0.0360	17½	0.1484
5⅛	0.0435	T	T
6⅛	0.0520	21	0.1781
7¼	0.0615	25	0.2121
8¾	0.0742	30	0.2545
10½	0.0891	35	0.2969

FIG. 5. **Effect of Various Radial Rake Angles on Tool Forces Acting on a Face Milling Cutter. (Points A and B represent cutters which had a negative primary radial rake angle of 12 deg. and a positive secondary radial rake angle of 15 and 30 deg. respectively).**



The horsepower needed to mill 1 cu. in. of metal per min. is computed as follows:

$$\text{hp per cu. in. per min} = \frac{\text{Net hp}}{\dfrac{\text{Volume metal removed (cu. in.)}}{\text{Cutting time (min)}}}$$

Substituting expressions and values previously determined,

$$\text{hp/cu. in./min} = \frac{\dfrac{(\triangle T)\ (0.3600)}{(1/F)\ (42.44)}}{\dfrac{0.0982}{(1/F)}}$$

$$= \frac{(\triangle T)\ (0.3600)}{(42.44)\ (0.0982)}$$

$$\text{hp/cu. in./min} = 0.0864 \triangle T \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 2$$

Maximum average chip temperature rise, $\triangle T_c$, can be found by two methods. In either case, the procedure of thermal balance commonly carried out in calorimetric tests is used. One method of determining the relation between calorimeter and chip temperature in these tests, assuming 0.110 as the constant specific heat of steel, is as follows:

$(\triangle T_c)$ (chip wt) (sp ht) = $(\triangle T)$ (water equivalent of calorimeter, water and chips)

$$(\triangle T_c)\ (0.0278)\ (0.110) = (\triangle T)\ (0.3600)$$

$$\triangle T_c = \frac{(\triangle T)\ (0.3600)}{(0.0278)\ (0.110)}$$

$$\triangle T_c = 117.724\ \triangle T \quad \ldots\ldots\ldots\ldots \quad 3$$

The values obtained with this formula exceed the actual maximum average chip temperature rise, in many instances by more than 100 F, because the specific heat of steel was assumed constant in the derivation. Since data on the variation with temperature of the specific heat of S.A.E. 1055 is not available, the above formula can be used to give approximations of the chip temperature rise.

To determine the maximum average chip temperature rise with a greater degree of accuracy, the initial equation in the derivation of Equation 3 can be used

$$\triangle T_c = \frac{(0.3600)\ (\triangle T)}{(0.0278)\ (\text{sp ht})}$$

Actually, the specific heat of steel increases with a rise in temperature, and the formula should be expressed as

$$\triangle T_c = \frac{(12.95)\ (\triangle T)}{\text{sp ht}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 4$$

in which the specific heat varies with the chip temperature.

Chip temperatures were assumed and the corresponding specific heat values for gamma iron were obtained from the A.S.M. Handbook.* A sufficient number of calorimeter temperature rise values were computed with Equation 4, using the gamma iron data, to plot a curve which represented the maximum average chip temperature rise. Thus the true maximum average chip temperature rise was not determined by the formula, but a corrected temperature value was taken from the curve or a table based on that curve. Although the latter procedure does not give absolutely accurate values, it is a much better approximation of the true chip temperature rise than that obtained with the former method.

Sample Computations:

Depth of cut: 0.125 in.

Speed: 1500 rpm
(1180 fpm)

Feed: 25 ipm
(0.00833 in. per tooth)

Cutting time: 1/25 min
(2.4 sec)

Volume of metal removed: 0.982 cu. in.

Weight of chips. 0.0278 lb.

Total water equivalent: 0.3600 lb.

Calorimeter temperature rise, $\triangle T$: 7.6 deg F

* A.S.M. Handbook, 1939 edition, table vi, p. 431.

1. Find net horsepower

$(7.6 \text{ deg F})\ (0.3600 \text{ lb.}) = 2.736 \text{ Btu}$

$$\frac{2.736 \text{ Btu}}{1/25 \text{ min}} = 68.4 \text{ Btu per min}$$

$$1 \text{ hp} = 42.44 \text{ Btu per min}$$

$$\text{net hp} = \frac{68.4 \text{ Btu per min}}{42.44 \text{ Btu per min}}$$

$$\text{net hp} = 1.6116$$

1. (a) By Equation 1

$$\text{net hp} = K_F \triangle T$$

from table 1, K_F for 25 ipm feed is 0.2121

$$\text{net hp} = (0.2121)\ (7.6)$$

$$\text{net hp} = 1.6119$$

2. Find horsepower per cubic inch per min

$$\frac{0.0982 \text{ cu. in.}}{1/25} = 2.455 \text{ cu. in. per min metal removed}$$

$$\frac{1.6116 \text{ hp}}{2.455 \text{ cu. in. per min}} = 0.6564 \text{ hp per cu. in. per min}$$

2 (a). By equation (2)

$$\text{hp per cu. in. per min} = 0.0864 \triangle T = (0.0864)\ (7.6)$$

$$\text{hp per cu. in. per min} = 0.6566$$

3. Find maximum average chip temperature rise:

The quantity of heat given off by the chips was determined from the product of the temperature rise in the calorimeter and the total water equivalent of the calorimeter. Before the chips fell into the water this quantity of heat existed in the chips only. Therefore, the 2.736 Btu in the foregoing computations must equal the product of the water equivalent of the chips and the increase in chip temperature caused by the cutting operation. The weight of the chips was 0.0278 lb. and assuming a constant specific heat for steel as 0.110.

$2.736 \text{ Btu} = (0.0278 \text{ lb.})\ (0.110)\ (\triangle T_c)$ then

$$\triangle T_c = \frac{2.736}{(0.278 \text{ lb})\ (0.110)}$$

$\triangle T_c = 894.7$ deg F maximum average chip temperature rise

3 (a) By Equation (3)

$$\triangle T_c = 117.724 \triangle T = (117.724)\ (7.6 \text{ deg F})$$

$\triangle T_c = 894.7$ deg F maximum average chip temperature rise.

4. True maximum average chip temperature rise cannot be computed readily because the actual specific heat at higher temperatures is not known. The values of specific heat for gamma iron were used despite the fact that gamma iron does not exist at room temperatures. It is certain, however, that S.A.E. 1055 will be in the gamma iron state when at temperatures above 1300 deg F. Temper colors of the chips indicated that the specific heat of S.A.E. 1055 varies similar to that of gamma iron. Until specific heat values for S.A.E. 1055 are available, those of gamma iron will serve the purpose in obtaining a temperature value nearer the actual temperature of the chip. A curve derived as previously described is a simple method of determining a corrected chip temperature rise from the calorimeter temperature rise. From this curve in Fig. 3, the maximum chip temperature rise was determined as 683 F. Adding the room temperature of 75 F which also was the temperature of the bar before cutting gives an average maximum chip temperature of 758 F. The term average maximum chip temperature is employed because observation of temper colors in steel chips indicate that a heavy chip has different temperatures on each side, the higher one on the side away from the tool. To facilitate interpretation of test results all formulas given herein are plotted graphically in Fig. 3.

With the calorimetric apparatus several thousand tests were conducted. The surface temperature of the workpiece was measured before and after each test with an Alnor low range themocouple. In figure 1 is shown a cutter which is a development growing out of this investigation; it has solid cemented carbide blades set at 15° positive radial rake and provided with a negative face 0.020" wide at the cutting edge. This milling cutter has been tried extensively in production tests and has proven superior in number of workpieces machined per grind. It cut at feeds and depths of cut which stalled the milling machine when ordinary negative rake angle cutters were used. In regrinding the cutter little carbide material was removed.

From the calorimetric power tests and cutter life tests which have been conducted for over two years the following points in particular have been established. Negative radial rake angles were found to produce stronger cutting tips, the cutting edges of which are less liable to fail from impact and shock when entering a workpiece of hard material as are the cutting edges formed by positive radial rake angles.

Power required at the cutting edge is higher for the negative radial-rake-angle cutter than for cutters with positive radial rake angles. This holds true for conventional cutting speeds as well as for higher cutting speeds up to 1180 fpm.

Cutters with negative radial rake angles will stand up longer at the higher speeds than positive radial-rake-angle cutters under identical conditions. At high speeds wear and failure at the cutting edge of a positive radial-rake-angle cutter will soon increase its power consumption above that of a cutter with negative radial rake angles. Average temperature of the chips produced by ordinary feed does not approach the melting temperature of steel even at high speeds.

A cutter with a 15- or 30-deg positive secondary radial rake angle at the cutting edge, with a negative primary radial rake angle 1 to 2 times the width of feed per tooth, was found to be more effective since it combined the increased strength of the cutting edge afforded by negative radial rake angles with the lower power requirement of the cutter with positive radial rake angles. See Figs. 4 and 5.

From the net horsepower at the cutter, as determined by the calorimeter, the tool forces were computed for the different rake angles with the formula

$$\text{hp} = \frac{F \times V}{33{,}000} \qquad F = \frac{\text{hp} \times 33{,}000}{V}$$

where V = cutting speed, fpm.

This force, F, is the resultant force of several component forces, and it can be seen in Fig. 5 that it increases with the negative radial rake angle and decreases with the positive radial rake angle. It also shows how much the tool forces on a cutter with 12-deg negative primary radial rake are reduced by the application of a positive secondary radial rake angle of 15 or 30 deg.

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By Elbert A. Hoffman and John M. Birdsong

Selection of Steel For Induction Hardening

Metallurgical factors affect applications and permit wider choice of steel.

INDUCTION hardening has been listed as one of the major metallurgical developments during this war period. Although induction heating has been used for the surface hardening of crankshafts for some ten years, the widespread application of induction heating has only come with this war.

For example, induction hardening of the 20mm. armor piercing shot has increased the quantity and quality of this important war material. Induction heating is particularly adapted for forming, brazing and hardening operations in making projectiles. For such applications the main advantages are speed and uniformity of heating—the ability to control the heat to specific patterns.

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The induction heating of billets for the forging of shells has increased the production, lengthened die life, and resulted in more compact installation. (Fig. 1).

Other early applications include the de-gassing of electronic tubes during the evacuation process during which the filaments were heated by induction, and the use of dielectric heating for therapy work, which has been practiced by the medical profession for a good many years. Diathermy can be cited as a familiar example.

Induction heating is the raising of the temperature of any material by the electrical generation of heat within the material and not by any other method, such as convection, conduction or radiation. A hollow copper coil through which cooling water is circulated and attached to a source of high frequency current is the heating medium. (See Fig. 2).

When the Japs took Malaya and the Indies, tin became a critical material. A method had to be found quickly that would save tin and thus lengthen our meager supply of this tremendously vital material.

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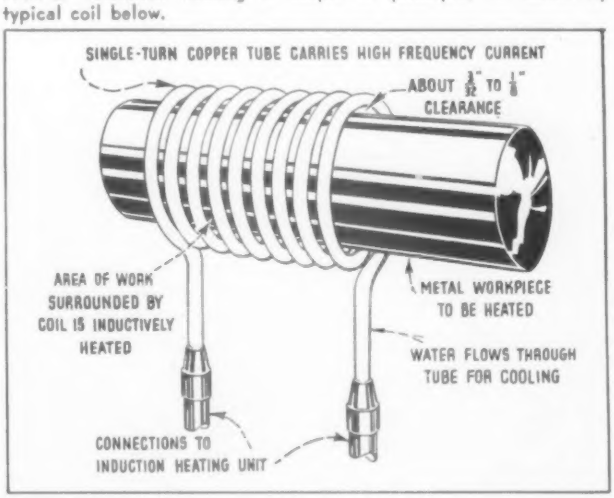
Steel engineers developed a method of electro-plating steel strip with a coating of tin only thirty millionths of an inch thick, saving two-thirds of our tin. But the coating was dull and granular—the problem was to flow the tin to make it smooth and corrosion resistant. Induction heating applied to the moving strip caused the plate to melt and flow evenly. The result—a smooth bonded surface, and less tin.

FIG. 1. Production boosted and die life increased by compactly installed induction heating units.

FIG. 2. Induction heating is simple in principle, as shown by typical coil below.



Resume of a paper presented at a meeting of Chicago Chapter, A.S.T.E.

However, the most widespread application has been the substitution of induction surface hardening for parts either heat treated throughout or case carburized. The substitution has enabled the manufacturer in a good many applications to completely machine the parts, then induction harden and use (without any further treatment). (See Fig. 3).

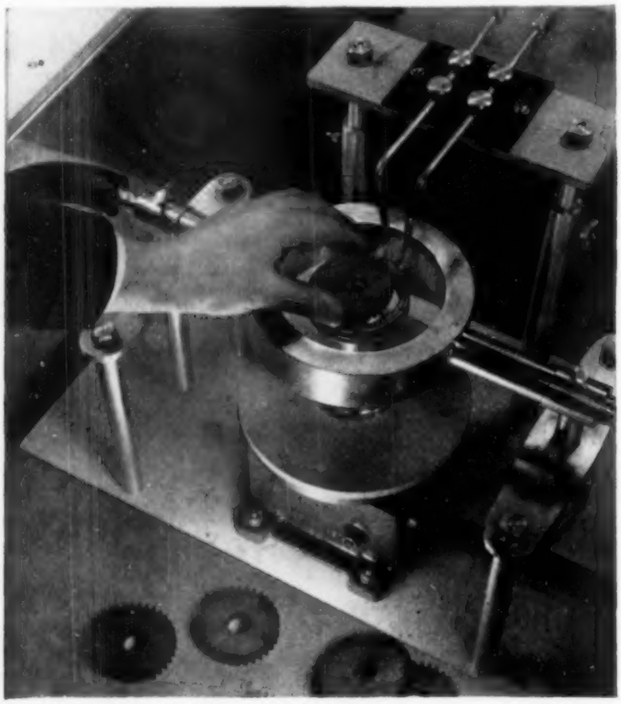


FIG. 3. Induction heating permits hardening of finished parts without further treatment.

Strange as it may seem, induction heating is not new, having been used for approximately twenty-five years for induction melting furnaces. Magnetic fields surround the coil which, in turn, surrounds the part being heated, inducing eddy currents in the work. These eddy currents together with the hysteresis effect generate the heat within the work; however, the current density is not uniform throughout the cross section of the work, but is greatest at the surface.

This phenomenon, called the skin effect—the action by which the current tends to flow more in the outer portion than at the center—has been utilized by the metallurgical engineer for the purpose of surface hardening.

The concentration of these eddy currents produces heat, first at the surface, then gradually transferring by conduction of the metal itself toward the center.

By quenching when only the surface is heated, a hardened case will be produced without affecting the core,—a condition similar to a carburized part.

Permits Wider Selection

High frequency induction hardening calls for a change in the selection of grades of steel suitable for induction hardening. Heretofore there has been a broad use of alloy steels, usually as a means of obtaining a specified hardness.

However, all indications are that a plain carbon steel can be used successfully for a wide variety of applications, and when only hardness to resist wear is desired, the use of alloy steels can be materially reduced. For example,—we have successfully accomplished many induction surface hardening applications using our "Sturdy-Fifty" steel, the analysis of which is similar to C-1050 and the resultant hardness being about 60 Rockwell C.

Other applications may call for a steel with more inherent free machining characteristics than our "Sturdy-Fifty" and may be accomplished with our cold drawn TRITEX No. 2, the analysis of which is close to C-1144. The resultant inductioned hardness is about 56-59 Rockwell C.

Where additional core strength for torsional or tensile properties is required together with localized hardness for wear, we have used our STRESSPROOF steel, and induction-hardened where necessary to obtain the required high surface hardness.

Several Types of Equipment

There are three main types of equipment developed for generating the high frequency current.

The first type is known as the motor generator type, which basically consists of a motor-generator set in the frequency range from 2000-12,000 cycles per second. It is used in comparatively large installations, ranging from 5 to 500 K.W. (See Fig. 4).

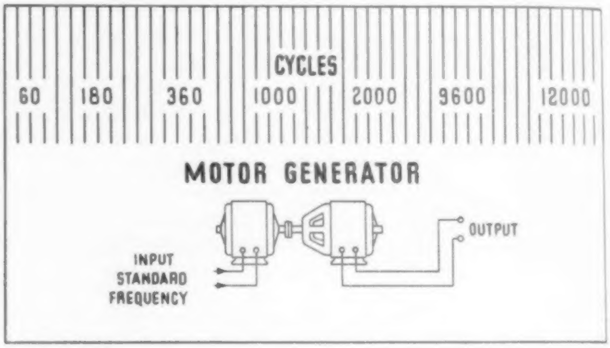


FIG. 4. Motor generator set, with frequency range 2,000 to 12,000 cycles.

The second basic type is called the spark gap set, with a frequency range from 10,000 to 300,000 cycles per second, and with its widest applications from 2 to 15 K.W. power output ratings. (See Fig. 5).

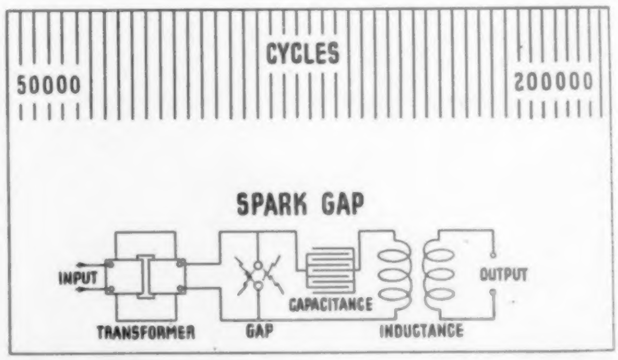


FIG. 5. Spark gap set—10,000 to 300,000 cycles per second.

The third type is known as the tube or electronic type of high frequency generator and is used in the frequency range from 300,000 to 3 megacycles or three million cycles per second, and normally in capacity ranges from 2½ K.W. to 100 K.W. (See Fig. 6).

A comparatively recent advance in induction hardening is in the surface hardening of parts without the use of an external quench. Known as the self quench method, this

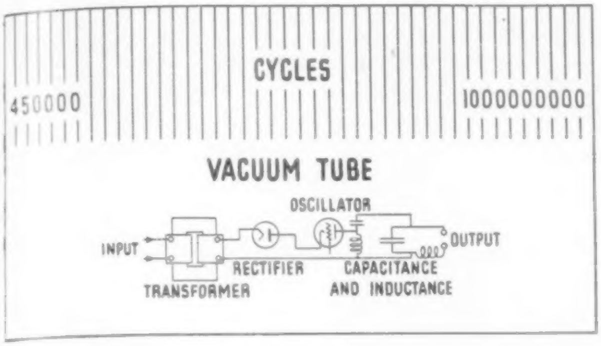


FIG. 6. Electronic type of high frequency generator. Range: 300,000 to 3,000,000 cycles.

process depends upon the use of high power inputs and frequency ranges beyond a million cycles per second. High powers are applied for short periods of time (usually less than a second). The heating effect being confined to the surface, the mass of unheated steel immediately below the heated zone withdraws the heat at a drastic quenching rate. Very little distortion or scaling is experienced with this type of heating and it indicates great promise for a variety of applications.

Postwar planning on parts which were either heat treated throughout or case carburized, should consider seriously the application of induction-hardening.

Sulphide Treated Steels

Machine parts that are induction case hardened, or fully treated, require the selection of the higher carbon alloy and carbon steels. The machinability of these higher carbon constructional steels has been enormously improved by a new development in steel making technology known as the sulphite treatment. It was developed by Messrs. E. L. Ramsey and L. G. Graper of the Wisconsin Steel Company and was described by them in 1942 at a meeting of the A.I.M.E. This process employs sodium sulphite instead of stick sulphur to improve machinability and increase tool life. There is no loss in the physical properties due to the sulphite treatment, and the steel heat treats, forges and anneals equally as well as the non-treated steel.

It has been a common practice to add sulphur to steel to improve machinability and the improvement so obtained is well known. However, the sulphides formed as a result of the sulphur addition tend to segregate at the grain boundaries, causing red shortness in the steel as rolled and increased brittleness in the finished product. Steels that have been treated with sodium sulphite are found to have a wide distribution of sulphides throughout the entire grain and show a lack of segregation at the grain boundaries, in contrast to that found in steels with stick sulphur additions. This arrangement of inclusions has no apparent effect on the rolling qualities of the steel, and the finished product has the same characteristics as if the sulphite has been added.

An explanation for this wide distribution of the sulphide inclusions lies in the chemistry of the sulphite addition. When sodium sulphite is added to molten steel, the heat of the molten steel decomposes the sodium sulphite into sodium oxide and sulphur dioxide. The sulphur dioxide thus formed is a gas and it is absorbed by the molten steel. The sodium oxide formed from the decomposition is a strong base, and this unites with the silicates and aluminates remaining in the steel from the deoxidization process. These abrasives form as a fluid slag on top of the steel and a typical analysis of this slag will show silican oxide 36.14%, aluminum oxide 28.77%, manganese oxide 5.51%, iron oxide 3.24%, sodium oxide 21.15%, sulphur 1.27%. Since the silicates and aluminates are abrasive, their elimination from the steel accounts in a great measure for the improved machinability reported by the users of the sulphite treated steels. This improvement in machinability can be illustrated by the following examples:

A farm implement rear axle approximately 30" long, 3" in diameter, is turned and splined for 5" at one end, turned and keywayed for 18" at the other end. When machined at 388 Brinnell from NE-8640 LA-SULPHITE steel, the tool life on 3 tools on the turning operation was increased 66%, 69% and 80% respectively.

A ratchet wrench socket made on an automatic screw machine with operations of form, drill and cut-off, when made from 1 1-16" round NE-8640 LA-SULPHITE steel, resulted in an increase in spindle speed of 61.8%, feed 45%, tool life 123% and pieces per hour 39.2%.

A front bolster shaft with five manufacturing operations, when made of C-1046 LA-SULPHITE steel, showed the following increase in pieces produced per tool grind:

1. Continuous turning 290%;
2. Intermittent turning 515%;
3. Milling flange 100%
4. Drilling 120%;
5. Milling keyway 120%.

Sodium sulphite can be added to all fine grain steels, improving their machinability by the addition of sulphur dioxide, and increasing tool life through the removal of coarse abrasives. Experience with over 200,000 tons of the product shows no loss in physical properties and indicates a minimum improvement in machinability of 25% with corresponding increase in tool life, a smoother finish, closer accuracy, and lower rejections. This steel is furnished by the La Salle Company in Cold Finished bar stock, Analysis NE-8640, under their trade name LA-SULPHITE. Other analyses can be obtained in either carbon or alloy grades when the quantity is large enough to permit manufacture.

American Meeting on Screw Thread Systems

Technical men from the Army, Navy, and Air Forces, as well as from the automobile, aircraft, machine tool, electrical, and other industries met in New York recently under the auspices of the American Standards Association to work on a series of standards for the threaded parts that go into aircraft engines, pipes for aircraft fuel lines, aircraft control mechanisms, instruments, and miscellaneous industrial applications. A series of technical meetings running through several days covered these subjects and others.

Purpose of these meetings was primarily to consolidate the American point of view before the expected gathering of British, American and Canadian technical experts at Ottawa sometime this fall under the auspices of the Combined Production and Resources Boards of which all three countries are members. It is expected that most of these American War Standards will ultimately become regular American Standards. The American Society of Mechanical Engineers and the Society of Automotive Engineers are joint sponsors of the ASA peacetime project on screw threads and are cooperating closely in the war work.

Practically all forms of threads came in for discussion, and the American War Standard on Acme Threads,—used widely for control mechanisms of aircraft and in vises and jacks—was completed. This war standard has already been adopted in Canada and is now under consideration by the British. This is but one of many meetings, both in the U. S. and abroad, for the purpose of setting up an international screw thread standard.

THE *Fundamentals* OF TOOL ENGINEERING

The Stranding of Wire

No. 5 of a Series

EACH of the preceding articles in this series—Extrusion; Swaging; Wire Drawing—has dovetailed into the next following. The *Stranding of Wire,* then, follows in orderly sequence, thereby leading the reader, step by step, through the various stages of wire processing. In this connection, wire manufacture implies mass-production on a huge scale, with the manufacture of wire making equipment a big industry in itself and calling for a high degree of tool engineering.

Whether used as electrical conductors or as wire rope, stranded wire comes under two distinct classifications—the flexible and semi-flexible. The first is made up of a number of sub cables, each of which is composed of a number of strands of very fine or comparatively fine wire. As familiar examples, we may cite the flexible cable used in automobile lighting and ignition wire, and the flexible wire rope used for brake cables and hoisting purposes.

The semi-flexible, on the other hand, is composed of a number of solid wires, each comparatively stiff in itself yet permitting a limited flexibility or bending. As pat examples in this class, we have starter and battery cable, and the steel cable commonly used as guy wire.

There is a further distinction in that some wire is merely twisted, as, for example, barbed wire and telephone cord. In the latter, each conductor is composed of flexible strands, rubber insulated and braid covered.

In principle, stranding machines are very simple although, for reasons to be shown, design calls for careful engineering. As an example, the simple machine, schematically shown in Fig. 1, involves no particular problems either in design or fabrication. The wire comes spooled, and each spool is mounted on a spindle provided with a simple tension device to prevent over-running or ballooning.

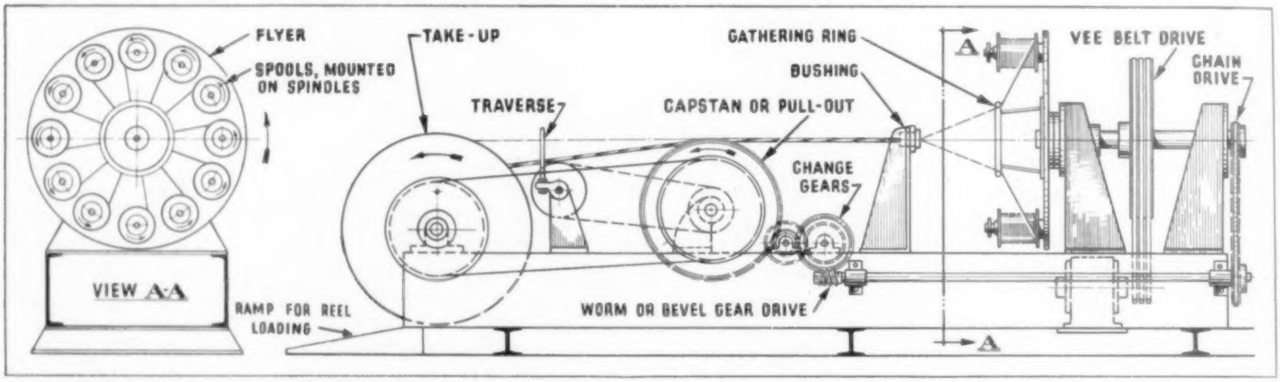


FIG. 1. Schematic diagram of simple strander, showing relation of flyer, capstan (pull-out) and take-up. Number of turns per unit of length is determined by change gears. Kick-off, for stopping machine, not shown.

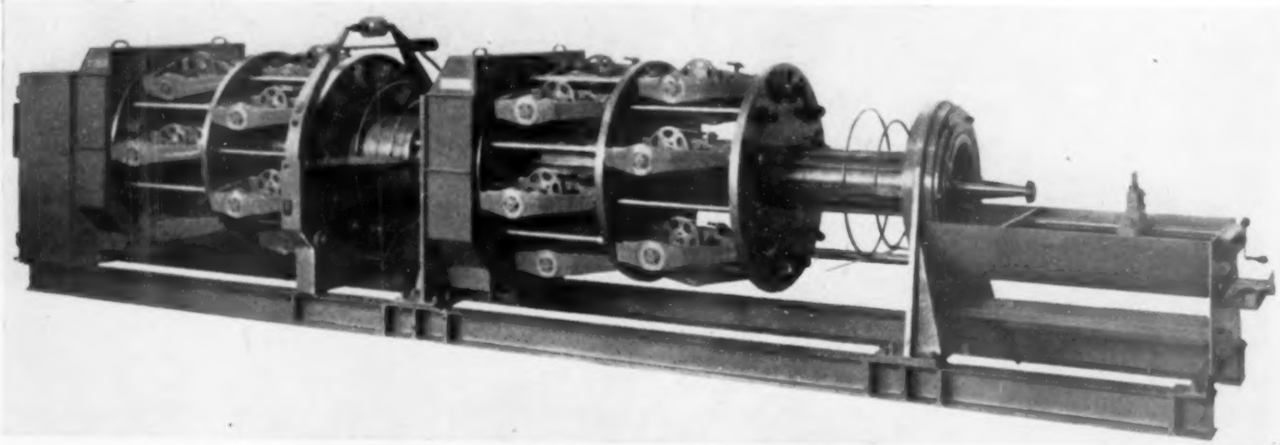


FIG. 2. Watson 25 bobbin Tubular High Speed Strander, for laying strand in single operation. Capstan and take-up not shown, these being separate units. Photo by courtesy of the Watson Machine Company, Patterson, N. J.

Each wire is threaded through an individual eye, preferably of glazed porcelain since the wire tends to cut into steel. Latterly, tungsten carbide eyelets have come into use in the higher grades of machines. The eyelets are secured in rocking arms which, should a wire break or run out, snap back and contact a switch or kick-off, when the machine stops, permitting repair—that is, welding the loose ends together.

The several stands are then led through a sizing bushing, and from there to a capstan—or, as it is commonly known, a pull-out or haul-off—which is timed to the lay by means of change gears. That is, there will be so many turns to the foot, and the capstan is coordinated with the flyer—or rotor—to produce the desired lay. From the capstan, the wire is wound up on a reel (take-up) which may be mounted on a simple stand with slip-belt drive —as shown in Fig. 1—or preferably, on commercial take-up stands especially designed for the purpose.

With heavier wire, we have an entirely different problem in that, instead of being on small spools, the wire is supplied on comparatively large reels, each of which may have a weight of several hundred pounds. This not only entails sturdy construction and high factors of safety, because of the great centrifugal force exerted, but a backward planetary motion on the part of each reel. That is, each reel must make a partial or complete backward rotation for each forward revolution of the flyer.

A high speed tubular strander is shown in Fig. 2. Machines of this type are employed where all the wires are laid in a single operation and with what is known as turn for turn back-turn. That is, the wire axis is kept from turning, with respect to earth, because each of the bobbin carriers or cradles float in bearings, and so balanced that they remain practically stationary, in relation to earth, as the flyer rotates.

This type of machine may have a bobbin capacity of 7 to 46, with speeds ranging from as low as 275 R.P.M., in the larger heads, to 3,6000 in the smaller. The machine shown is a Watson TH7-4, 25 bobbin capacity, with the rotor a fully machined and dynamically balanced steel tube with welded in spiders. Automatic brakes—in this case thrustor actuated—stop the rotor in from 3 to 6 seconds. Wire guides are tungsten carbide, and wire angles, from full spool to cradle nose and from nose to rotor guide 35° maximum. The capstan or pull-out is not shown, but its principle of operation is quite similar to that shown in Fig. 1.

Fig. 3 shows a planetary stranding machine, a type considerably slower than the tubular machine described above. With this type, the bobbin carriers or cradles spin backward in relation to the earth as the flyer rotates. This implies a true planetary motion since the planet, in addition to moving in an orbit, also spins on its axis.

In this case, the motion is used to compensate for the difference between the actual length of each strand and the stranded cable in a given unit of length—say a foot. This difference is due to the helicoidal path which each wire takes in the stranded cable—that is, there is usually up to 5% more length of wire in each strand than in the stranded cable itself when finished.

This machine is also a Watson—No. PH6-4—and is a 24 bobbin head and perhaps represents the ultimate in compensating action in making strand. The rate of spin of planet (spool carrying cradle) on its own center, while moving in the orbit of the rotor, is variable. This is necessary for different sizes of wires and for different sizes of strand.

Usually, this type of machine is restricted to the manufacture of strands or cables of high physical strength, as for the highest grades of wire rope. However, its scope will doubtless be widened due to new developments, as the trend toward high tensile electrical cables, such as overhead transmission lines of hard drawn copper bronze or combination cables of aluminum with steel cores.

This machine, too, is shown without a capstan since, as a rule, these are separate units, like the take-up. However, these units operate about as shown in Fig. 1 and, in the case of the capstan or pull-out, are timed and coordinated to the speed of the flyer.

Lay of wire may be easily calculated, since it is merely a ratio between the number of turns and the rate of pull-out. For example, if the cable advances 3″ to one turn of the flyer, the lay will be four turns per ft. The rate of pull-out, in turn, is determined from the peripheral travel of the pull-out sheave—or capstan— which is governed by change gears.

A simple formula also serves for strand production comparison, as follows: *

$$= X \frac{KP}{\frac{200\,KP}{SL} \pm ph} = \text{Ft./Hr.}$$

Bare wire strand output.

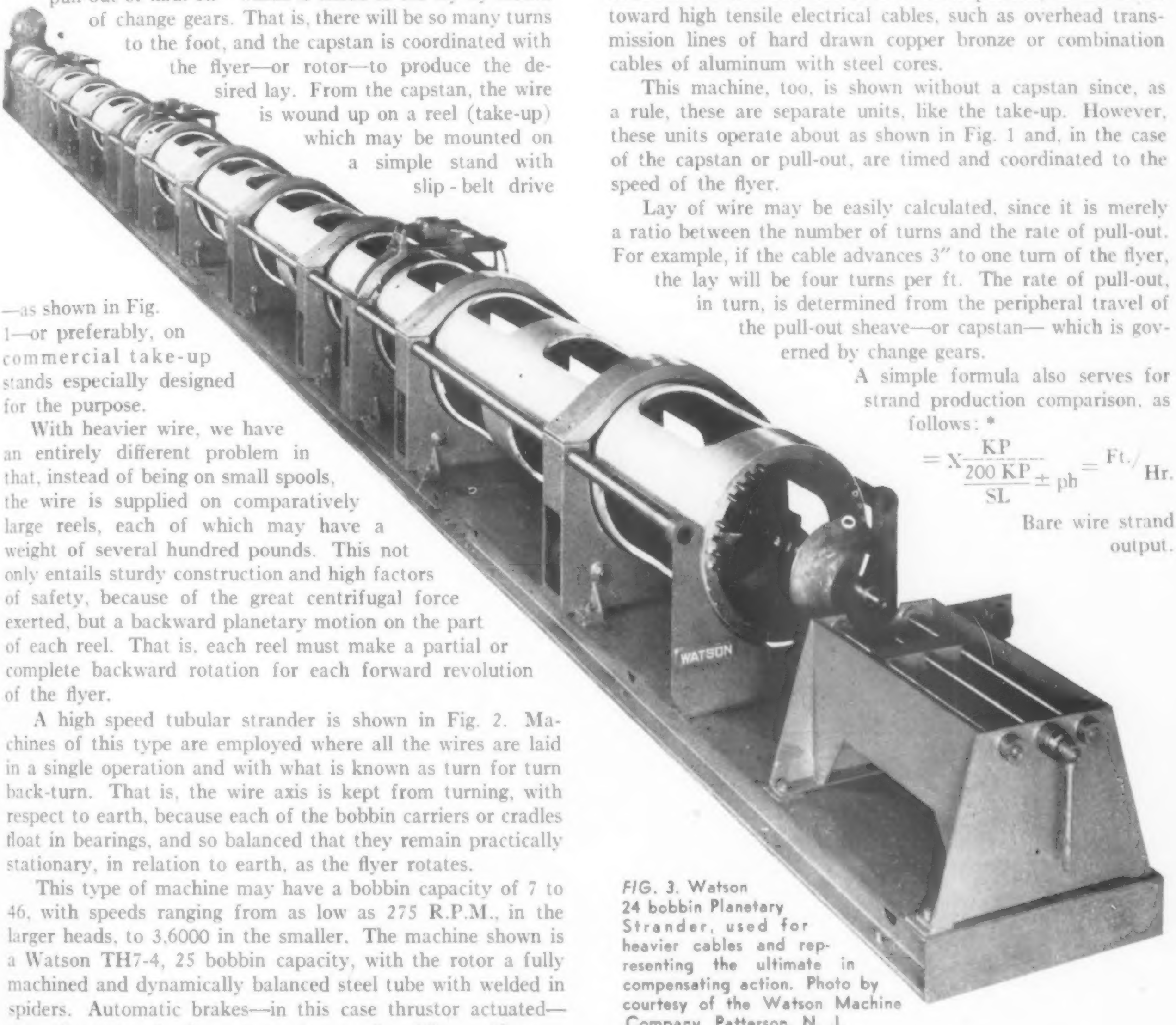


FIG. 3. **Watson 24 bobbin Planetary Strander, used for heavier cables and representing the ultimate in compensating action. Photo by courtesy of the Watson Machine Company, Patterson, N. J.**

K = Ratio of length of finished strand to wire fed per unit length. L = Lay in (mean) inches. P = Feed spool capacity in pounds. S = Rotor speed in R.P.M. h = Stop time per load in hours. p = Wire weight in pounds per 1,000 ft.

We have mentioned, above, the function of the take-up, which is to reel the strand up as it comes from the machine. While these may be elementary, as shown by the slipping belt —Fig. 1—which compensates for the decrease in surface speed as the reel loads up, commercial take-up stands are to be preferred since they are self contained, both as regards drive and traverse—i.e., the close, side-by-side winding of the cable on the reel, to and fro.

* Formula by courtesy of Watson Machine Company.

Next, in this series, we will take up the insulating of wire to be discussed in the August issue of THE TOOL ENGINEER along with kindred processes.

By Eric H. Wang

Solution of Epicyclic Bevel Gear Problems

Schematic diagrams clarify involved gear trains.

THE method developed here, though not superior to the conventional methods as far as time and effort is involved to obtain the solution, has nevertheless the advantage of giving the engineer a clearer picture of the movements in an epicyclic bevel gear train and to allow a graphical check up on the result obtained, in this way reducing the possibility of an error to a minimum.

The basic form of an epicyclic bevel gear train, to which most of the more complicated ones can be reduced, is shown in Fig. 1. Gears A, B, and the idler are bevel gears free to turn on the shaft or the arm extension of the shaft. Revolutions forced on gears A and B, for example with the aid of the belt driven pulleys shown in Fig. 1, will not only cause the idler to rotate around its own center, but will also cause the arm and shaft to rotate. Or forced movements on the shaft and A will cause B to make a definite number of revolutions in relation to the given movements.

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The problem is now to find the unknown number of rotations. The face width of the gear of course has no influence on the number of revolutions; the same is true for the shape of the arm, whether it is under a right angle or in some other way inclined against the shaft as shown in Fig. 1. We, therefore, can replace Fig. 1 by the sketch in Fig. 2 to study the movements. The gears represented by these lines have, of course, still the same number of teeth and also make the same number of revolutions as before.

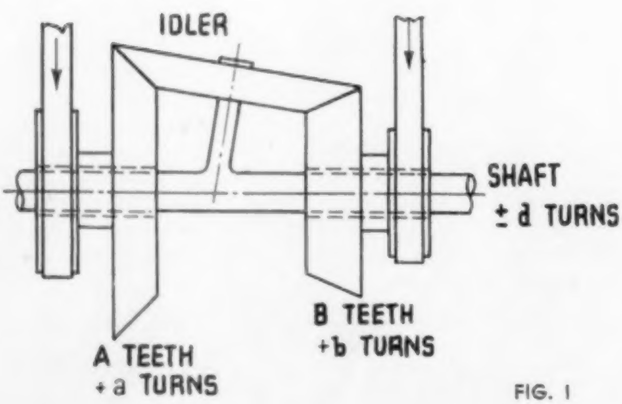


FIG. 1

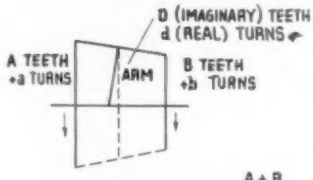


FIG. 2 $D = \frac{A+B}{2}$

We want, for example, to find the number of revolutions that the arm D makes if A makes "plus a" and if B makes "plus b" turns. (The arrows represents the direction of the movements as seen by the observer, and "plus" is therefore considered as counter-clock-wise).

We imagine the arm D as another gear with the same pitch as A and B and the idler, and see from Fig. 2 that such a gear consequently has $D = \frac{A + B}{2}$ teeth. (Formula 1.)

Looking at our gear train from the top the sketch would show the picture in Fig. 3. The idler is represented by an ellipse and is neither in size nor inclination of any influence on our further calculations, as long as it is a single gear.

We now draw into Fig. 3 lines whose lengths are in proportion to the linear velocities of the respective pitch circles.

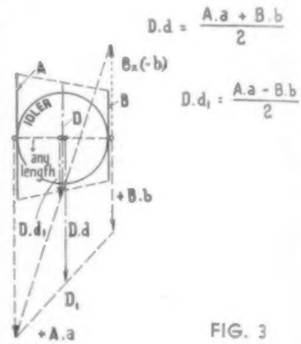


FIG. 3

These velocities are proportional to the product of the number of teeth times the number of revolutions.

$A \times (\pm a)$ respectively $B \times (\pm b)$

The product Aa, Bb, etc. will appear frequently in the following formulas, and we might as well give it a name and call it, say, "Tooth-turns."

The sketch in Fig. 3 indicates the tooth turns laid out in a plane and shows clearly that *in order to make these two different movements on the periphery of the idler possible,* its center will have to have moved *to the point D1, after having described a circle corresponding to the (imaginary) tooth turns of the arm:*

$$DD_1 = D \times d$$

Apparently $D \times d = \frac{Aa + Bb}{2}$ or, in the case of one gear running in the opposite direction: $D \times d_1 = \frac{Aa - Bb}{2}$, as shown in Fig. 3. In words: *The (imaginary) tooth turns of the arm are the arithmetic mean of the tooth turns of the first and last gear in a three gear epicyclic gear train:*

Substituting the imaginary number of teeth in the arm from Equation I, we get. The number of revolutions of

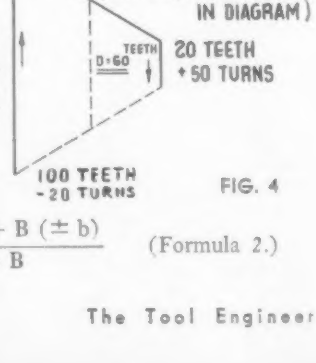


FIG. 4

the arm: $d = \frac{A \times (\pm a) + B (\pm b)}{A + B}$ (Formula 2.)

Here is an example (Fig. 4):

Find the number of revolutions of the arm if A has 100 teeth and makes −20 revolutions, while B has 20 teeth and makes + 50 revolutions.

From Equation II: $d = \dfrac{20 \times 50 - 100 \times 20}{100 + 20} = \dfrac{1000 - 2000}{120} = -\dfrac{1000}{120} = -8\tfrac{1}{3}$ turns.

The graphical checkup in Fig. 4 shows that the arm D has 60 (imaginary) teeth, while Fig. 5 gives Dd as − 500 "tooth turns," which, divided by 60 gives our $-8\tfrac{1}{3}$ revolutions.

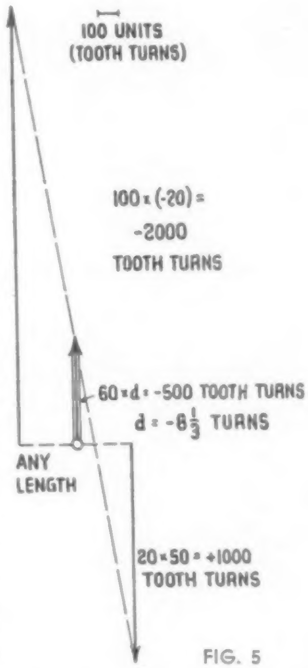


FIG. 5

How to reduce a compound epicyclic bevel gear train to our basic figure.

Fig. 6 shows A driving C_A, which is fast on C_B, which in turn is driven by B. All we have to do now is to find a gear X, which will have the identical effect on C_B as A has through C_A on C_B. This gear X is to mesh with C_B and shall be driven with the same number of revolutions and in the same direction as A. Obviously the number of teeth in such a gear must be in the same proportion to A as C_B is to C_A; thus: $C_A : C_B = A$, or $X = A \times \dfrac{C_B}{C_A}$. (Formula 3.)

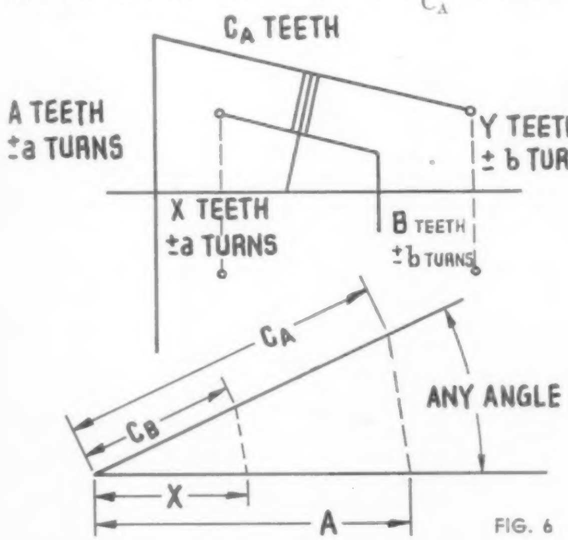


FIG. 6

The same reasoning in regard to the other idler gives a gear $Y = B \times \dfrac{C_A}{C_B}$. (Equation IIIa.)

The result can be checked graphically in many ways; one is shown in Fig. 3.

With the aid of X we can replace our original train A, C_A, C_B, B, by X, C_B, B, or with the aid of Y by YC_AA, and then treat either one of them as basic figures, turning the arm D at the same rate and in the same direction as in the original.

Assuming + a and +b turns, train XC_BB would give: $d = \dfrac{B \times b + X \times a}{B + X}$. (See Formula 2); this is further equal to $\dfrac{B \times b + A \times \dfrac{C_B}{C_A} \times a}{B + A \times \dfrac{C_B}{C_A}} = \dfrac{C_A\,Bb + C_B\,Aa}{C_A\,B + C_B A}$ or for train

YC_AA: $d = \dfrac{Aa + Yb}{A + Y} = \dfrac{Aa + B\dfrac{C_A}{C_B}\,b}{A + B\,\dfrac{C_A}{C_B}} = \dfrac{CAa + C_A\,Bb}{C_B\,A - BC_A}$

the identical value as above.

Here is an example of a compound epicyclic bevel gear train (Fig. 7).

The sketch shows that the 50 tooth gear could be replaced by a $50 \times \dfrac{36}{54} = 33\tfrac{1}{3}$ tooth gear. Then $33\tfrac{1}{3}$, 36 and 18 constitute our basic train, which will cause the arm to make the same number of revolutions, as in the original 50, 54, 36, 18 tooth gear train; or we could replace the 18 tooth gear by an $18 \times \dfrac{54}{36} = 27$ tooth gear. (See graphical check in Fig. 7).

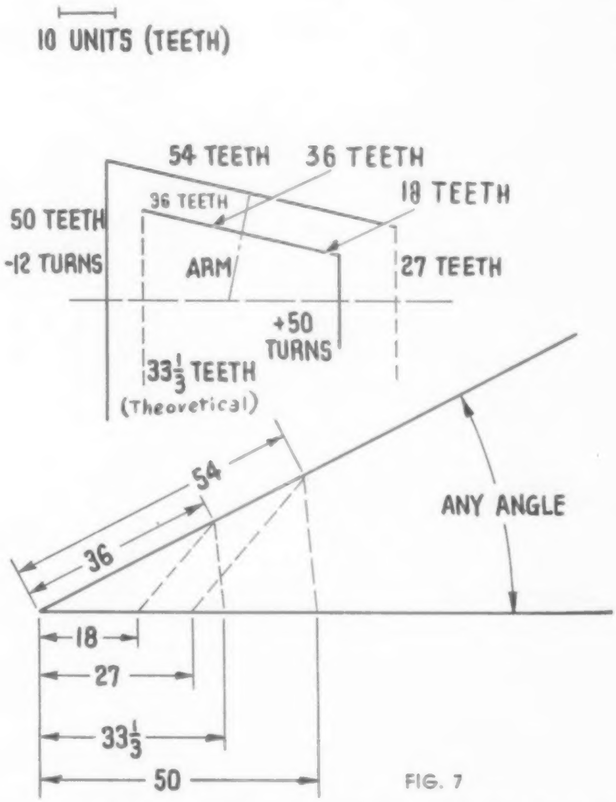


FIG. 7

From there we proceed according to Formula 2: $d = \dfrac{27 \times 50 - 50 \times 12}{27 + 50} = \dfrac{1350 - 600}{77} = +\dfrac{750}{77} = +9\dfrac{57}{77}$ turns.

We must get the same results of course, with:

$d = \dfrac{-33\tfrac{1}{3} \times 12 + 18 \times 50}{33\tfrac{1}{3} + 18} = \dfrac{-100 \times 12 + 18 \times 150}{100 + 54} = +\dfrac{1500}{154} = +9\,\dfrac{57}{77}$

The graphical check would have to be made according to Fig. 5. Other values can be found of course by simple transposition of the formulas, when the number of revolutions of the arm is known.

The following is an example of a double epicyclic bevel gear train that will require a little different reasoning. (Fig. 8). We will also show here how to treat other types of compound trains. The 12 tooth gear A, with + 72 turns forced upon it, meshes with C (18 teeth), which is fast on arm D.

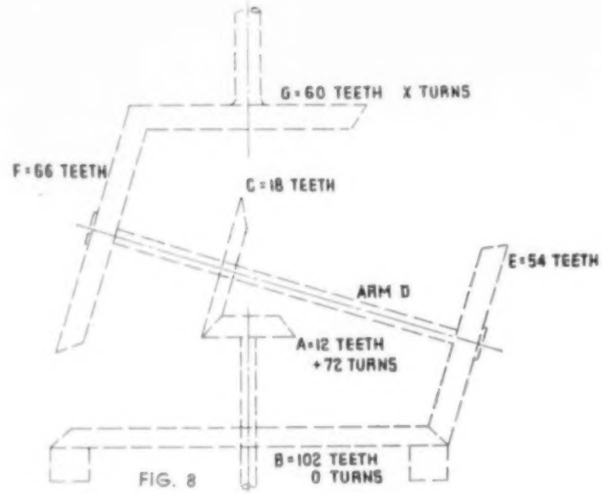


FIG. 8

The arm D, which turns with C, rotates E (fast on arm, 54 teeth) to roll on B (102 teeth, locked against rotation). On the other end of arm D is gear F (66 teeth, fast on arm). F drives G (60 teeth) with an unknown number of turns X.

Such a problem is solved by reducing the train to two of our standard compound epicyclic bevel gear trains.

For example: Train 1 runs A, C, (D), E, B, with d, the number of turns of the arm, as the unknown. The solution is shown on part of Fig. 9. We can replace B by M, meshing with C, and making O turns like B. We draw any direction of rotation of M into the chart, assuming it to be the same as for B, if this would rotate. To have the same effect on C as B has on the way over E on C, we have to give $M = B \times \frac{C}{E} = 102 \times \frac{18}{54} = 34$ teeth.

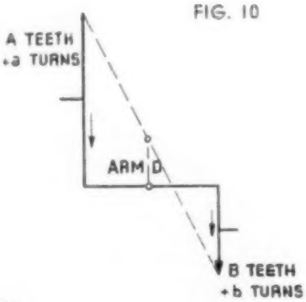


FIG. 10

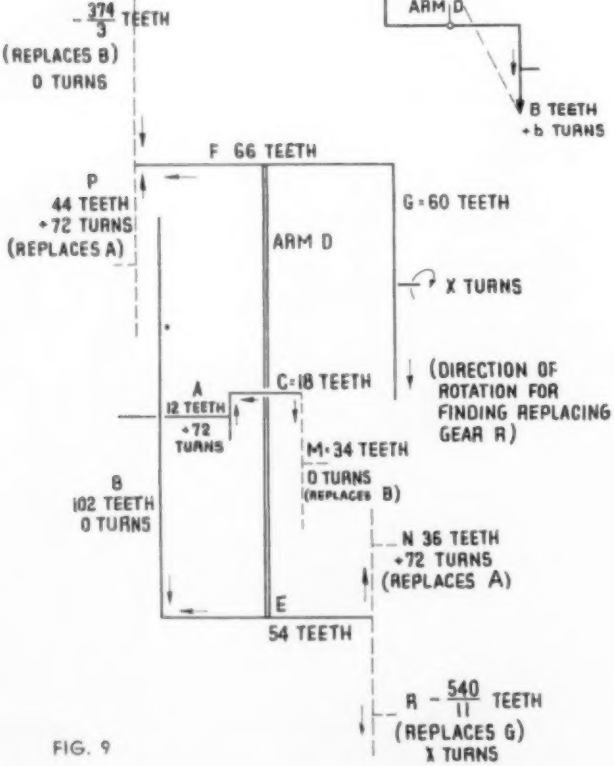


FIG. 9

Then, according to Formula 2: $d = \frac{A \times a + M \times m}{A + M} = \frac{12 \times 72 + 34 \times 0}{12 + 34} = +18\frac{18}{23}$ turns of the arm D, in the same direction as A. We could, of course, get the same result by replacing A by N with $N = A \times \frac{E}{C} = 12 \times \frac{54}{18} = 36$ teeth, then: $d = \frac{36 \times 72 + 102 \times 0}{36 + 102} = +18\frac{18}{23}$ turns.

Knowing the number of revolutions of the arm, we take A, C, (D), F, G as our second epicyclic bevel gear train. —P replaces A and has $P = A \times \frac{F}{C} = 12 \times \frac{66}{18} = 44$ teeth.

Since $d = 18\frac{18}{23} = \frac{44 \times 72 + 60\,X}{44 + 60}$, we can calculate X by simple transposition of the equation. $X = -20\frac{28}{115}$ turns, indicating that G makes approximately 20¼ turns opposite to the direction of A, when A revolves 72 times.

If we pick another part of the train, B, E, (D), F, G as our second standard compound gear train, we see that we can not replace B in the same way as before by another gear, having the same effect on F as B will have over E. To retain the same direction of the rotation of B this (imaginary) replacing gear would have to be opposite to the standard position in our basic train.

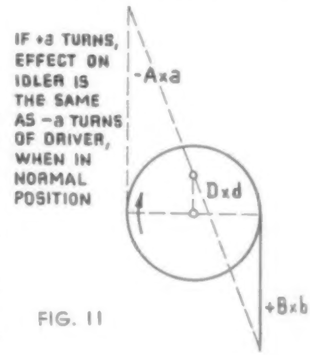


FIG. 11

Figs. 10 and 11 show sketches of this other basic form which does not correspond to an actually existing gear train. Fig. 10 shows, that the (imaginary) number of teeth in the arm D would be $\frac{B - A}{2}$, while Fig. 11 demonstrates that the "tooth turns" of A are *negative* despite that the gear revolves in the positive direction.

Our Formula 2 then becomes: $d = \frac{B \times b - A \times a}{B - A}$, indicating that in such a case we simply take the number of teeth negative to arrive at the correct result. For Fig. 9 this result would be: Q (replacing gear for B) $= B \times \frac{F}{E} = 102 \times \frac{66}{54} = \frac{374}{3}$ teeth. This has to be taken negative as explained above. The basic train is now Q, F, G, X. The number of revolutions of G can now be found from

$$d = 18\frac{18}{23} = \frac{60\,X - \frac{374}{3} \times 0}{60 - \frac{374}{3}};$$ from which $X = -20\frac{28}{115}$ turns as before.

Another possibility to solve this would be to replace G by R, which is supposed to have the same number of revolutions as G (Fig. 9). In this way we make the basic train B, E, R, similar to Q, F, G. R would have $-60 \times \frac{54}{66} = -\frac{540}{11}$ teeth.

X again is calculated by transposition from: $d = 18\frac{18}{23}$

$$= \frac{102 \times 0 - \frac{540}{11}X}{102 - \frac{540}{11}}$$ from which $X = -20\frac{28}{115}$ as before.

The graphical checks are the same as in Figs. 10 and 11.

By Louis Polk

The Tool Engineer In The Postwar Era*

Reconversion, expansion and countless new products will make him a key man in industry.

"WHAT does Management expect of tool engineering, and from tool engineers, during reconversion and the era of peacetime production to come?" The answer to that question calls for an omniscience not possessed by the writer. The crystal ball somehow doesn't convey the picture, although Sunday graphics prophecy futuramas not yet visible on the practical, industrial horizon. However, we may sense some indication of the future from the experiences of the past, and thereby work out a course through or around the more obvious problems. We'll try to hold detours at a minimum.

In referring to tool engineering, we include not only tool engineers, but in a broader sense all those associated in tool engineering, such as process men, master mechanics, production executives, inspectors and so on. And, in the line of industrial opportunities, a partial list includes the leading manufacturers of accounting machines, registers, and office appliances; agricultural equipment, refrigerators and air conditioning; automobiles, automotive parts and equipment, electric motors and appliances, measuring instruments, standard and special gages, tools, dies, engineering science and so on ad infinitum.

***Louis F. Polk* was graduated, in 1926, from Miami University School of Business Administration. Upon graduation, he joined the Sheffield Corporation, becoming vice-president and general manager of that company and the Cimatool Company in 1934, and president of the Sheffield Corporation, their successor, in 1941.**

Understandably, we not only have pride in all these organizations, and in the modest part we may play in them, but we also count them among our very special industrial blessings. Without them, we might have no need for a tool engineering society! Our individual and collective opportunities are in direct proportion to their number, size and growth. They widen our field and horizon, broaden and deepen our scope of experience. They help us to be better than average tool engineers.

Two Cooperating Groups

Today, however, we naturally divide in two friendly, cooperating groups with identical, long term interests. One group includes members of the independent tool engineering companies, while the other has become individually specialized and works for mass production manufacturers. Both groups provide fields in which to gain experience as well as to achieve success.

* Resume of paper presented at recent meeting of Dayton Chapter, A.S.T.E.

It was natural, in preparing this article, to contact the heads of a number of plants, in order to ascertain what top management expects of the tool engineer. First, there was the comment "We still have the job of defeating Japan—being sure the Services are properly supplied in the Pacific." Second, there was agreement that, barring some unexpected catastrophe—anything might happen temporarily—tool engineers would be busy during reconversion—and, for that matter, for several years thereafter. Management would like to emphasize that tool engineers will occupy a key position in industry, that the quality of their work will be an important factor in determining how successful business will be in producing jobs for people in the years just ahead.

You will be interested in one remark by the head of an internationally famous industrial company, who said: "When the war is finished, we expect to have the largest tooling program in our history." He feels that his belief reflects the expectations of manufacturing industry in general. And several others commented on the natural effects of fatigue and war jitters, resulting from the increased pressure of the last few years. They expressed the hope that tool engineers in both production plants and outside companies could revitalize themselves through the stimulus of working on creative projects rather than destructive ones, with the resultant return to the constantly improving quality which characterized tool engineering in the pre-war years.

The Tool Engineer a Liaison Man

Quite frankly, management and the tool engineers are in much the same position—for that tired, overworked feeling, many resort to vitamin pills and thereby gird themselves for new, competitive industrial battles, which in peacetime are even more intensive than in wartime. There the boys play for keeps—no quarter is given and none asked.

Several top executives mentioned the "gypsy" tool engineer, roving from plant to plant much like the rolling stone. Now, top management isn't blind to the value of healthy change. A certain amount of it, particularly in the early days as a beginner, provides a varied and all-round experience that possibly can't be had from just a single plant. As the years pass, however, a sober sense of settling down to achieve success can bring increased profit and security to the individual, his family, and his company. Today, the tool engineer can keep abreast of the times through such means as this Society, with its national and Chapter meetings, its periodic visits to other plants, and through cooperating and working with progressive independent tool companies.

Another top executive approved the modern tool engineer because he was not a "reactionary" or too rugged an individualist. He explained that a good tool engineer is a genuine liaison man between all the factors involved in conceiving and putting tooling successfully to work on the production line.

All of us know what a reactionary is since, in recent years, the political campaigns have kept us informed. A tool engineer reactionary thinks his particular brain child—a special design, a die, a gage or special tool—is a "sacred cow," untouchable and something to be fought for, unchanged to the

bitter end. Inversely, the progressive tool engineer must promote, by tactful approach, cooperation so that all will accept sound change. When the tool engineer, individually,—or as a member of a department—finds himself in the *middle* between sales and product engineering on one hand, and manufacturing and inspection on the other, he must be a diplomat in compromising and working out in practical fashion the problems and differences that naturally arise.

Toward that goal, top management wants us to do more of a selling job with sales and product engineering as well as inspection and manufacturing.

A Force for Harmony

It takes tact, judgment, and respect for the other fellow to avoid needless bickering, to bridge the gaps that exist in such circumstances. The wise tool engineer always will work for harmony. For example, manufacturing is primarily concerned with getting out a product, while inspection primarily guards dimensions and tolerances. The tool engineer wants to please both by promoting effective practical unity. He puts statesmanship into his thinking and into his performance. He recognizes that his particular job is the means to an end, not the end itself. He knows that the real goal is the satisfactory, low cost production of a quality product that will be enthusiastically demanded by the market. No one has a greater opportunity to be of real, down-to-earth assistance. It is the tool engineer's opportunity, and he should grasp it in constructive and friendly fashion.

There will be many practical and technical problems coming up during reconversion, and management expects that wartime ingenuity and devotion to accomplishment will prevail in establishing a peacetime prosperity. To quote the head of a large manufacturing plant: "Let's get back to considering cost as a major factor in production, as contrasted with the paramount wartime objective of speed first, and lower cost second. Even more ingenuity will be necessary in devising new means and ways of tooling a product so that product cost is kept low and tool costs are kept relative to the number of products that are to be produced, and this is to be done without sacrificing the necessary degree of quality."

Effective Programs Approved

Here is a real opportunity to demonstrate genius and ability, since cost is a factor of great importance. And, recognizing that there can always be honest differences of opinion, if the tool engineering department presents an effective program, in an objective and persuasive fashion, most top managements will consider net ultimate cost and will normally approve justifiable expenditures that will assure reaching the final objective. No competent tool engineer hesitates to recommend justifiable improvements in methods and equipment when he knows that his judgment will be confiirmed by results.

Let us take an example from a familiar field. Before the war, tool engineers at Frankford Arsenal recommended multiple electric gages known as Multicheks to replace hand gages for inspecting critical dimensions on shells. First cost of the new gages was comparatively high, but let us look at the final results! Official Ordnance records show that just one of these multiple electric gages, typical of hundreds in use, has already checked over 5,800,000 shells with five dimensions for each shell, or a total of 29,000,000 inspections, with a saving of 32,000 man hours, which is 4,000 days of labor for one man. The purchase of new and more expensive equipment greatly reduced final costs. By substituting uniform mechanical operation for the "sense of feel" in hand gaging, multiple electric gages, in almost every case, not only made inspection faster and more accurate, but unexpectedly increased the percentage of acceptable material by eliminating improper, previous rejections.

Increasingly, in the last decade, careful attention is being given to industrial relations. By and large, in Dayton, we can include among our present industrial blessings a normal peacetime labor supply of constructive workers, well above average in intelligence. As capable tool engineers, we must wisely respond to their problems and requirements without sacrificing progress in tooling and methods. This often requires us to properly interpret an overall or long range view and to clearly present good, sound "reasons why" in a forthright, friendly manner. If we are to deserve the respect and cooperation of intelligent labor—and this is part of our daily job and responsibility—our attitude should be that of a salesman selling ideas on the basis of their merit. This may be a new function for some of us, but tool engineering does require salesmanship—sometimes of the highest order. This should be kept in mind and expressed in our actions.

All of these management recommendations mean that management expects us to do our job. And we're going to do it! We're over 21 and able to stand on our own feet, nor do we expect anybody to hold a handkerchief to our nose. Our individual progress isn't going to be automatic, but it is enough, for the energetic and deserving, that here in the United States there are many industrial opportunities to challenge our abilities.

Quality Control Essential

And so, whether we are discussing independent tool engineers or in-plant tool engineers, the end result desired by management is the same: (1) to supply machines and tools to make the product according to final approved or modified design; (2) to supply with these machines and tools an economical plan for manufacture and assembly; (3) to control the degree and quality through the entire manufacturing cycle and final assembly, all this to be done at costs which meet or beat competitive product prices and performance.

To accomplish this, tool engineers all over the country are giving increased attention to controlling the quality during machining and assembly. Since this determines and controls product performance as well as cost, it is just as important an engineering function as the designing of the tooling. This trend in dimensional control matches the advance of inspection from the original "back door" operation—the term applied to final inspection of the product just before shipping it.

As the purchase of parts and assemblies from the outside grew, inspection became a "front door" as well as "back door" operation. Increasing interest developed, in better product performance and lower assembly cost, fewer rejections, less scrap and rework, and reduced service expense. To accomplish this, tolerances became more positively held throughout the entire manufacturing and assembly cycle, and it was necessary to have a more scientific inspection of tools, gages, and even the machines themselves. Many of you have had first-hand opportunity to watch and to help this program unfold. It has meant, overall, a net reduction in manufacturing costs, and has contributed its part to the successive lowering of war product prices. Often, it has required special gage fixtures, perishable "Go" and "No Go" external and internal standard gages, and thus, in recent years, interchangeability and unformity became increasingly important.

The manufacturing problem has become more difficult through the loss of some of our best manpower, which has had to be replaced with unskilled and untrained help. This

resulted in the further development and application of air gages, electric, optical, combination, multiple, automatic and semi-automatic types of gages. Indicating instruments eliminated the need for acquiring a skilled sense of feel often required in using plug and snap gages. This is particularly noticeable where tolerances were .002″ and under, since conclusive tests show that human beings just do not consistently make an accurate repetitive check to such limits with fixed type gages.

Tool Engineer Determines Quality

At the same time, processes and tooling—such as jigs, dies and fixtures—have been made more fool proof, less dependent upon the operator. Thus the quality of individual parts, as well as assembled products, is now determined in large measure by the tool engineer in the specifying of tool tolerances and design. Likewise, his specifications for gages and measuring instrument help control quality at low cost through the various stages of manufacture.

This was confirmed by the president of a large electric company, who emphasized that tool engineers, individually and as a group, should continue to accept increasing responsibility—this somewhat new "war born" responsibility of producing economically to new precision standards at lower net costs. He felt that the tool engineers' primary function must be to keep their respective companies astride and abreast of recent and coming developments in practical fashion. Only in that way, he believes, will it be possible to couple high grade and high quality with low costs, so necessary if we are to approach or meet the nation's tremendous goal for jobs in peacetime industry.

In this creative way our Tool Engineering profession has developed over the years. Many have put their brains and energy into it. Let us make it our goal to do something extra to build up our profession in our own communities. With such enlightened approach we will help build more and larger plants; we will help attain higher production, new products, new services, and give extra service every day on the job in devising better means for overall production at relatively lower costs to successfully meet world competition.

Consciously or unconsciously, many of those who have worked in the tool profession in the last 50 years developed more than machinery and material things. In their practical work they developed a base which provides for today's mutual understanding and self-respect, an appreciation of the problems, the experiences, the abilities, the labors and the products of each other. This doesn't just happen. It meant an effort every day in the year for someone. It meant temporary and sometimes permanent sacrifice of time, money, health and strength. With great faith in their work, even in its earliest days, even when times were occasionally almost impossibly difficult and discouraging, many still stayed with their profession and now, we who enjoy in part the results of their sacrifices must be sure we take our turn in sowing good seed for the future.

Tool Engineering a Matured Profession

Tool Engineering has come of age. Today's tool engineers, confident in the security of their knowledge, modestly recognize that to counsel with others is not an admission of weakness—it's a positive confirmation of personal ability and strength of personal integrity and loyalty to the job. Without a chip on its shoulder, tool engineering faces its greatest responsibility and opportunity. Let us possess a genuine and healthy pride, not only in the profession, but in our entire community. It is said that when the story of the original airplane flight at Kitty Hawk by the Wright Brothers arrived in Dayton, one of our citizens responded, "It ain't possible for human beings to fly, and even if it were, nobody from Dayton could do it." Fortunately, that negative and envious spirit need not be present in our profession. As tool engineers, we know that, as we respect others, we maintain our own respect and deserve the friendly cooperation and support—the unqualified respect of others.

Difficult Pipe Tapping On Standard Tapper

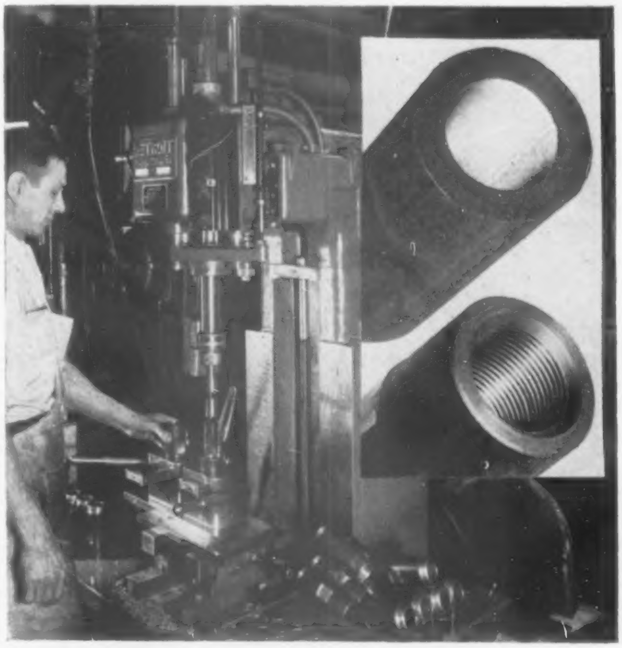
ORDINARILY, tapping a 1⅝″-10 thread in pipe, having a rough I.D. of about 1½″, to a length of 4½″, exerts considerable strain on machine spindles and holding fixtures. Especially so, considering the high torque resulting from the practically 100% full thread and the wide chip of a 10 pitch tap.

However, use of a standard lead-screw machine, plus a rugged, hard gripping shuttle fixture, made possible production of 70 pieces per hour, with negligible rejects, despite the fact that relatively unskilled operators were employed.

The machine is a standard "Detroit" Medium Duty (MTM) tapping machine, built by Detroit Tap & Tool Co., in which the power take-off, for driving the tap, is at the base of the leadscrew immediately above the spindle. With this construction, the lead-screw functions merely as a guide, without being subjected to driving torque.

The tap used is a standard "Detroit", ground with a long chamfer, spiral pointed and mounted in a floating holder. This design permits the chip to be thrown ahead of the tap, avoiding a tendency, on the part of the chip, to roughen the thread.

The fixture, which is a two-position manually operated shuttle type permitting loading and unloading while one workpiece is being tapped, has a .020″ float, necessary because of the rough I.D., for centering the work. The fixture is designed and built by Schneider & Makowski, who also manufacture the parts described.



Heavy Tapping, on Medium Duty Tapper, made possible because lead screw acts as a guide only and is not subjected to tapping strains.

By Arthur A. Schwartz

New Production Methods

Induction heating, new alloys, harder cutting tools, friction sawing, hot forming, powder metallurgy all portend great advances in postwar years.

WITH regard to production methods, industry stands again at the crossroads. Like Eli Whitney, who boldly stepped out on the (then) practically untrodden road of interchangeability, we are now stepping out into little known methods of production that may be equally revolutionary, but which may increase production severalfold over what, today, may be termed fantastic quantities at ridiculously low costs.

Born in Chicago in 1880, *Arthur A. Schwartz* received his B.S. from University of S. Dakota in '99. A varied career includes mining in Alaska, irrigation in Mexico and plenty of automotive experience. Since '38, he has been production and research engineer with Bell Aircraft Corp'n.

The war has stimulated production and production methods and many things which, previously, were but vague ideas are now at hand demanding utilization. Each of these opens new fields—virtually, virgin fields. Take, as an example, Induction Heating. While the discovery of the principle is more than 20 years old, its utilization is just beginning. However, too many do not understand the essential difference between Induction Heating and older forms of heating. We have been used to furnaces heated directly by the combustion of some sort of fuel, or indirectly by electricity flowing through resistors. In either case, we have had furnaces filled with hot air or gases, and heated to some fixed, elevated temperature.

Here, however, the temperature of the furnace is the definite maximum to which we may heat a workpiece. Note, also, that all during the heating cycle the object is bathed in hot gases, and that the rate of heating decreases as the workpiece approaches the temperature of the furnace.

Seconds Instead of Minutes

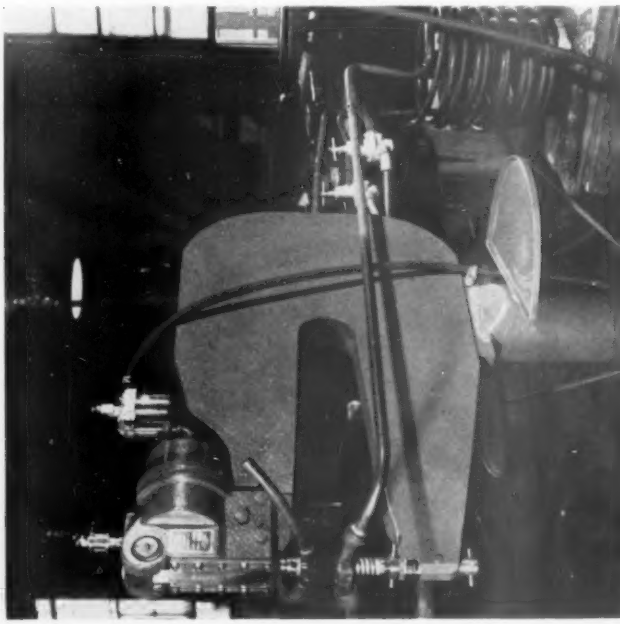
With Induction Heating, there is no definite limit to the temperature the workpiece may attain. The rate of heating is a constant easily controllable within the capacity or power of our generator and applicator, and there are no hot gases bathing the workpiece. Furthermore, results are obtained in fewer seconds than the minutes we are accustomed to allot to the traditional heating period.

After thousands of years of heating by furnace, it may be rather difficult to change our habits of thinking toward application of the new lines mentioned.

Once we grasp the difference, however, we glimpse a new era of the use of heat in industrial production. Spot annealing, hardening, or carburizing becomes a simple matter and can be done at such speeds that it becomes a part of

Simple fixtures and induction heating units speed brazing of cutting tools and parts assemblies.

Experimental hot air dimpling machine can also be used for heating rivets for riveted assemblies.



production cycle, perhaps attached to the automatic machine that makes or forms the parts.

But, that is only a small part of what induction heating is capable of. There are many things that, made easy by this technique, are impossible by other methods. As, for example, the control of depth of heating to the thousandth of an inch; the localizing of the heat to the area and the shape of the area wanted, and the ease of avoiding too much oxidization or decarburization due to the fact that all this takes place in cold air which, to all practical purposes, is chemically inert.

Then, there is the availability of high temperature without the necessity of building a furnace to operate at these super-high heats (say around 4000° F.), and the speed at which all this may be performed. Brazing becomes a precision operation performed in a few seconds, and small parts that were laboriously machined and fastened into place may now be cast in place, thus entirely replacing, if not eliminating machining and assembly time.

Instantaneous Hot Forming

With very little imagination, one can visualize a progressive die on a punch press blanking, piercing, forming, and trimming and perhaps heat treating with or without carburizing, where the difficult forming operation is made simple by almost instantly raising the temperature of the blank between the piercing and forming operation to such temperature as to make the impossible forming simple and practical.

We have always thought of Butt Welding as an operation requiring a separate machine. By means of Induction Heating it may become just a routine action of some other machine like a turret lathe or what have you. But, enough of this, perhaps, although the subject is by no means exhausted nor even adequately outlined. However, a hint or two may suffice for the production-minded.

New Metals and Alloys

As a result of research and development, we now have a bewildering array of metals and alloys, and more are coming every day. The alloy steels are slowly becoming tougher and more sensitive to heat treatment, and the Tool Engineer will have to add to his drawing the how, when, and means to heat treat. Also, he will have to show, on his drawing, the location and kind of heat treatment on each piece, so that his tools will work as they are intended to work.

Let us point out, here, some of the later metal arrivals in the field of tools. Beginning with the cutting tool metals, we find newcomers hailed as the one and only for all purposes. That is stretching the truth, to put it mildly. Most of these metals excel in some particular quality, such as, hardness, abrasive resistance, or toughness; also, the most are sadly deficient in some of the desirable qualities. A good many are merely copies of existing tools although, aside from the copies, there are many outstanding new metals and improvements on old metals.

For example, a manufacturer is turning out Tantalum in quantities, and while this is an old metal, it was always in the rare class and highly priced. While the price is still high, it is being used in ever increasing quantities and, because it has outstanding qualities, it fits in with our needs in modern cutting tools. Its melting point is around 5200° F. with hardness not definitely known but very high. Also, it has the highest resistance to abrasion we know of today. It is used in some of the best carbides and, in the writer's belief, is one of the component parts of our modern stellites.

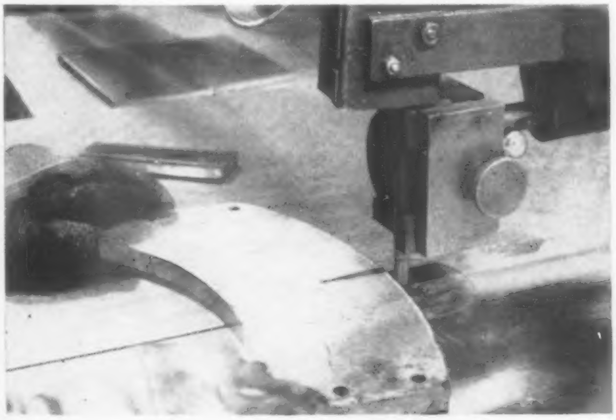
The word stellites is used because cast metals is too inclusive and the stellite was the first of the present multitude of cast tool bits. As a part of stellite, it raises the hardness of those metals well above the usual Rockwell 60-61 "C" and, at the same time, it greatly increases their abrasion resistance. These tools make almost unbelievable runs as form tools where their characteristic razor sharpness is of greatest use. For example, we replaced a high speed steel form tool, that was turning out 80 pieces per grind, with one of these Tantalum bearing stellite tools and it was personally checked for sharpness when it had completed 9000 pieces and no regrinds.

Rebuilding by Redraw

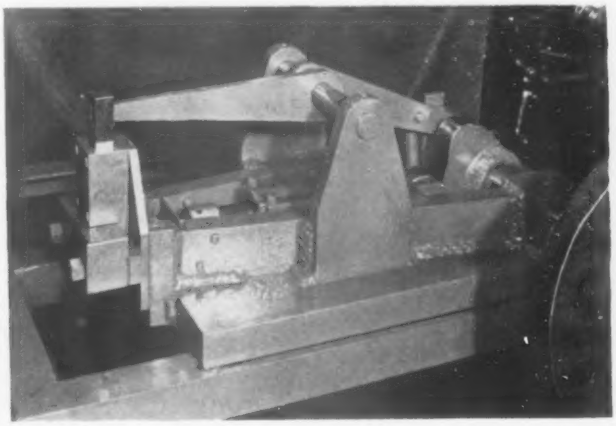
Then, there is just coming onto the market special heat treated, high speed steel where the complete grain structure is rebuilt by successive draws. You can tell these tools by their Rockwell "C" 67 hardness and they are so tough that, in thin sections, they can be permanently bent at this hardness. They are still high speed steel but they seldom crater and for shock resistance, like intermittent cuts, they are unsurpassed.

We will have to use care in selecting our cutting tools and use the best ones fitted for the individual jobs. We can no longer prescribe carbides as the ultimate since many of these new and special cutting materials, when applied to the job they are fitted for, will out-perform the best of the carbides.

Hot saw or friction saws used to cut armor plate—may even be used to cut hardened steel.



"Hot" cold rivet forging machine among new gadgets with a future in industry.



Some of the "stunts" that this war has brought forth are going to remain with us for a long time. Others are already in the limbo of "not so hot." The friction saw, however, is a practical tool for the small shop as well as for the production lines. We no longer think of hardened steels and tools as untouchable except by grinding. The friction saw cuts and files hard steels easily—the harder the material the easier it cuts. Most of the stellites—particularly the Tantalum bearing kind—can be used for friction drilling or reaming so we can now rework or repair tools after hardening. Also Induction Heat allows us to spot anneal. We remove broken taps and dies by electric spark disintegration.

The once impossible jobs are being rapidly shifted to the easy column and, regrettably, perhaps, the expert mechanic seems to give way more and more to the improved methods and means of today. With all due regard to the necessities of the war effort, one is still sorry to see the pride of achievement of the old line mechanics slowly diminishing. They were, and are, the backbone of our democracy—certainly of industry.

Metals Plasticized

One thing more, in connection with new methods that, in time, are going to dominate the production field, and that is "Hot Forming"—pressing, forging, rolling, precision casting, powder metallurgy. All these have two things in common:—(1) the use of heat to make the materials more plastic and workable, and (2) they produce very few if any shavings. We used to figure that the sale of shavings would pay for the heat, light, and power—but, turning a pound of 30 steel into ½ cent shavings is an expensive way to pay utility bills.

All this was in mind when, in the opening paragraph, it was said that we may be entering a new phase of production. If we can now utilize heat for putting our materials into a plastic state, we can then form it without waste into the parts we want and do it so cheaply that the price of the material becomes the major factor in our costs.

In the lighter metals, and particularly in the aluminum alloys and magnesium, there is quite a long range of temperatures at which we can work these materials without appreciably damaging the grain structure. In fact, we can arrange our dies, rolls, or other forming means to make decided improvements in the grain flow, so, we wind up with better and stronger parts than we would have if we cut them from the bar or billet.

And, while the ferrous metals do not lend themselves to this process as easily as the light metals, they do not offer any insurmountable difficulties.

Heating Now a Minor Problem

Let us point out some of the things that make this process usable now. First, we are now able to make the necessary molds or dies from metals that work and stay put at the temperatures necessary for successful forming. Tungsten and Tantalum, and others like Chromium and even Cobalt, will retain their strength and shape under quite high temperatures. Small dies can be cast in one piece from one or another of the stellites. Even high speed steel can be used for forming dies for aluminum and similar metals. Fortunately, these do not take the beating that, for instance, drop forging dies do.

Then there are so many ways of heating available today that heating should be a minor problem. Remembering, for example, that Induction Heating is much used by the steel makers, let us not hesitate to use it for steel forming.

Then, there is heat control. There are so many methods and gadgets for controlling heat, including the radiation pyrometer that works on the old blacksmith's principle of "just taking a look." You will be able to find two or three instruments for every conceivable exigency.

When it comes to machines, we have the ever increasing multitude of hydraulic presses, and we have our friends, the welding engineers who can make an imposing frame for any machine, large or small, from a little boiler plate and some welding rod.

Resume of a paper presented before the Rockford Chapter, A.S.T.E.

Coordinated Machine and Fixture

A two station fixture, in combination with a standard lead screw tapping machine, has practically eliminated loading and unloading time ordinarily required in tapping a ⅝"-18 hole, to a specified depth of .400", in flare noses manufactured in a mid-western Ordnance plant. And, despite that unskilled operators have been employed, rejects have been all but eliminated.

Clamping the workpiece, with a ball handled lever, automatically aligns it in position. By such coordination a production of 450 pieces per hour is averaged—or at the rate of 8 seconds, floor to floor time.

The machine is provided with sensitive, automatic control, with spindle travel held within .005" limit, and further provided with a sensitive slip clutch which prevents damage to both work and machine. The fixture, in turn, is of the shuttle type, one end of which is unloaded and reloaded while the workpiece is being tapped under the other end.

The combination leaves the hands of the operator entirely free to handle the work, and since he can neither crowd nor retard the tools, tool life has been considerably increased. This, in combination with a 100% automotive machine, insures smoothly, accurate threads. The equipment—machine and fixture—was designed and built by the Cleveland Tapping Machine Company.

By John E. Capell

Ultimate Shear Strength of Materials

Shear, on punches and dies, increases press capacity.

The chart and formulas below, provide a ready reference for determining the ultimate shear strength of various metallic and non-metallic materials, and the pressure required for shearing and punching these materials. Wherever possible, however, and as a precautionary measure, it is advisable to reduce the pressure required, especially when the tonnage of the available power press corresponds too closely with the calculated pressure required for the particular die being designed.

This reduction is obtained in two methods of adding a shear on the cutting members of the die:

(1) Where large blanking or shearing surfaces are present a shear angle is ground in either punch or die—the total depth not exceeding the stock thickness.

(2) Where a large number of piercing punches are present the punches are step ground—that is, ½ or 1/3 are step ground—the steps not exceeding the thickness of the material.

The simple formula then used to reduce the required pressure when a shear is applied is as follows, in which S is the calculated shearing pressure in tons, and P is total shear pressure required, in tons with shear applied:

1. For material under ¼" thick .... $S \times .25 = P$
2. For material over ¼" thick .... $S \times .67 = P$

Example: (1) For material under ¼" $20 \times .25 = 5$ Tons
(2) For material over ¼" $20 \times .67 = 13.4$ Tons

Note: The resultant tonnage must not exceed the tonnage capacity of press available.

MATERIAL		TONS PER SQ. IN.
ALUMINUM	2 S Hard	6½
	3 S Hard	8
	4 S Hard	10½
	11 S-T	15
	14 S-T	12¼
	17 S-O	9
	17 S-T	17½
	17 S-RT	18
ALCLAD	17 S-T	16
	A 17 S-O	7½
	A 17 S-T	12¼
	2 4 S-O	9
	2 4 S-T	20½
	2 5 S-T	17½
	3 2 S-T	19
	5 1 S-O	5½
	5 1 S-W	12
	5 1 S-T	15
	5 2 S Hard	12
	5 3 S-O	5½
	5 3 S-W	10
	5 3 S-T	12
	6 1 S-O	6¼
	6 1 S-W	12
	7 0 S-T	18½

MATERIAL			TONS PER SQ. IN.
BRASS		Soft	15
		Cast	18
		Hard	20
BOILER PLATE			30
COPPER		Cast	12½
		Rolled	13½
COLD DRAWN ROD			29
DRILL ROD			40
DOW METAL	CASTING	H-AC	8
		C-HTA	10
		M-AC	5
	BARS AND RODS	F S-1	9
		M	7
		0-1	9½
	SHAPES	J-1	9
		M	7.
		Ma	8
		FS-1a	8½
		FS-1h	9½
		J-1a	9½
		J-1h	10

MATERIAL		TONS PER SQ. IN.
DURALUMINUM—Soft Sheet		15
FIBRE		12
MONEL METAL	Cast	30
	Rolled Sheet	32½
NICRO COPPER		15
PHOSPHOR BRONZE—Soft Sheet		20
SAE CARBON STEEL	1010	22½
	1025	25
	1050	35
	1075	40
	D-1095	42½
STAINLESS STEEL		35
TIN	Sheet	2½
	Cast	3
ZINC	Cast	7
	Die Cast	8
	Rolled Sheet	9
WROUGHT IRON		20

Westinghouse Demonstrates Jet Engines

As an indication of coming trends in postwar engine manufacture, a group of eastern aircraft manufacturers and their engineers were interested spectators at a test of military jet propulsion, held recently at the Westinghouse Electric Corporation Aviation Gas Turbine Division, at South Philadelphia, Pa. The "preview" was under authority of the Navy, for which Westinghouse is said to have developed the first all-American design of jet propulsion engine as differentiated from the "rocket" engines.

The engines shown ranged in size from midgets, the size of a heavy artillery shell, to large models producing as much power as the largest reciprocating type aircraft engines yet built. All of the models demonstrated—i.e., of gas turbine engines—utilized "axial flow," or straight-line principle of design. R. P. Kroon, engineering manager of the Division, further stated that the air compressor which supplies the huge volume of oxygen needed for the 1,000 m.p.h. jet stream is built on a common shaft with the turbine which powers it. This permits of very small engine diameters for the power output.

"This," Mr. Kroon stated, "will enable airplane designers to fit engines wholly within the wings, eliminating the 'barn door effect' of large diameter engines. At high speeds, the air resistance of conventional piston engines can absorb as much as half the engine's total power."

Of particular interest, inasfar as it concerns postwar aircraft design and manufacturers, are the comments by G. H. Woodward, manager of the Division. "As soon as military demand permits, a part of the Company's manufacturing facilities wil be turned to the production of commercial versions of the present jet engines. These postwar designs, however, will have propellers driven by compact, light weight gas turbines somewhat similar to those that now produce jet thrust for high performance military aircraft."

Coming events casting their shadows before them, we may well be on the alert for a "reconversion" of tooling, as far as aircraft and aircraft engines are concerned, that may entirely obsolete present day techniques. Long envisioned, the jet engine seems destined to be the revolutionary of the skyways, if not of the highways.

Frank T. Wruk

Cutting Your Costs With The Hack Saw

Recent developments in machines, blades and methods make this process economical and speedy.

IN THE past hacksaw machines have been considered secondary types of machine tool equipment. That, however, is not true today. The operation of cutting, or sawing, is an important factor in mass production and, in presenting the subject, it will be shown—and, be it hoped, proven—that hack saw machines and blades are precision tools, inexpensive yet efficient for cutting almost all types of materials.

Of late, there has been considerable progress in the design and manufacture of hack saw machines and blades. There is little comparison between the fast accurate modern cut-off machine and the jerky bias cutting tool of a past generation. The modern hacksaw compares favorably with the best machine tools found in the mass production plant.

This improvement has been going on over a considerable period of time. For example, in 1914 a high speed cut-off machine quickly revolutionized this phase of metal cutting.

***Frank T. Wruk*, Assistant Works Manager of the Peerless Machine Company, now closely associated with sales engineering, is a veteran of twenty years of specializing in the research, development, and manufacture of the metal cut-off machine.**

In 1920, another revolutionary change was made in the design,—a machine with a four-sided saw frame and four-sided saw frame guide. For this particular calendar bracket of time, this machine was capable of unbelievable cutting speed and accuracy.

In 1935, another big step forward was taken in manufacturing machines for longer life and uniformity, and in 1943 and 1944, still another big step—yes, the biggest of all time in the history of hacksaw manufacturing. New machines came to life which, today, are recognized as the fastest precision means for sawing metal at the lowest possible cost.

Constant Improvement

Constant and intensive specialization in handling a wide variety of sawing jobs resulted in development and improvement of metal cutting machines, such as the Hydra-Cut, Mechani-Cut, and many others. Machine life and uniformity steadily improved to keep pace with the evolution that has taken place during these years. Today's precision saws cut fast and clean. They are low in price and give lasting, dependable service.

In an effort to solve unusual cutting problems for the hack saw users, to save valuable man hours and to save valuable material throughout the nation's production lines, highly skilled technicians in our laboratory work out sawing production problems received from plants throughout the country. Every kind of material including many special alloys, are put through sawing tests. Each customer, upon request, receives a report of the research procedure followed in solving his problem, together with recommendations as to the proper machine for the job, the correct blade, the feed pressure, cutting time per piece, blade life, and so on. In other words, a complete job of production planning is done for the customer.

Due to the great variation in savings when replacing old equipment with new, modern machines, the case of one customer who requested information as to how much saving could be derived by installing new modern sawing equipment may be of interest.*

Modern Machines Pay Dividends

It was necessary, in this case, to ascertain what kind of sawing equipment the customer had, what the cost was per cut, etc. It was found that he had five old, large, circular saws to do his general required sawing. Arriving at the following figures with the *customer himself*, we found that because of the difference in width between their circular saw teeth and the hack saw blade, a substantial saving in material could be made. Under their existing production schedules, this amounted to forty-five tons yearly, at a value of $3,600.00 (based on a value of $80.00 per ton). Also, the faster cutting action of the new saws, plus improved design features, such as automatic stock feed and automatic clamping, resulted in the same amount of work with two machines, and one operator per shift, as they were then doing with two operators. Thereby, much needed manpower was made available for other war work, with an estimated $4,200.00 yearly direct labor saving.

The circular saws required sharpening once every four days at a cost of $2.00 each which resulted in a yearly expenditure of $600.00. The two hack saws are using one blade per day each, at a cost of 50c per blade, or a yearly expenditure of $300.00, resulting in a $300.00 yearly saving in tool supplies. The new installation, therefore, resulted in a total yearly saving of $8,100.00.

Blades of Tungsten and Moly

Power hack saw blades are made in many lengths, widths, and thicknesses. The material most commonly used in the manufacture of power blades, is the high speed tungsten steel and high speed molybdenum steel. Both the Tungsten and the Molybdenum are good dollar values.

The blades are made in six different widths: 1", 1¼", 1½", 2", 2½", and 4½" wide and in ten different lengths: 12", 14", 15", 17", 18", 21", 24", 30", 32" and 36"; in five thicknesses: .049", .065", .072", .100", and .125"; different tooth spacings: 14, 10, 6, 4, 2½ and 2 teeth per inch.

There are two different types of hack saw teeth; however, one type most commonly used is the straight face with a straight 57° angle back. The other is the 10° under-cut face tooth with a 5° cutting edge clearance and a rounded back, closely resembling a milling cutter tooth. In most of the

** Name of manufacturer is withheld but can be had by special request and at the customer's consent.*

bl..des mentioned there are found two different types of *set*. O.. is known as the straight set where the teeth are flared al..rnately,—one tooth is set to the right, the next to the le.., to the right, to the left, and so on. The other set is kn..wn as the raker set. In this set every third tooth is left str..ight, one tooth is set to the right, next to the left, the th..rd is left straight, repeating this order throughout the bl..de.

In a coarse tooth blade, such as the 4 pitch or coarser, th.. writer favors the raker set because the set can vary as to width and the straight tooth known as the raker tooth will cl..ar the center of the cut and guide the blade, thus eliminating chatter and producing a nice clean, smooth cut. On a blade without the raker tooth, the set must be limited as to width, the teeth must be set so at least 1/3 of one tooth will lap the other. If it is set wider, the blade will quiver and a finish like a washboard will be produced.

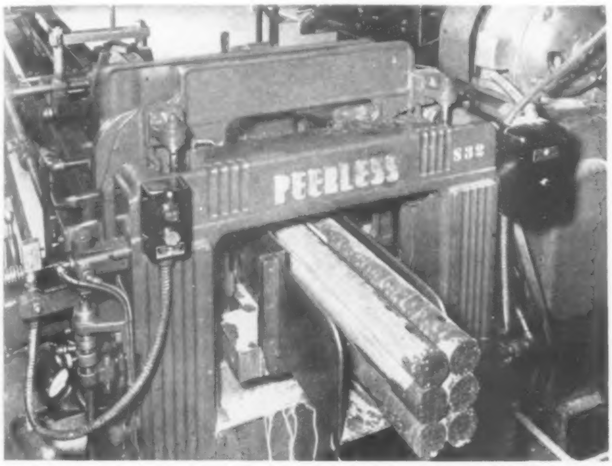
The power hack saw blades that are popular today on the heavier type machines, as to number of teeth per inch, are the 4, 6, and 10 tooth blades. The 4 tooth blade is generally used for cutting medium and large soft materials. The 6 tooth is best adapted to the cutting of medium sized bars of hard materials. The 10 tooth blade would be used for cutting small bars, light angle iron, thin wall tubing, etc. Modern metallurgy is responsible for the progress made in the manufacturing of the blade we have today. It surpasses anything we ever had before. Today's blade can be subjected to much greater punishment and will cut metal faster and last longer.

Blade Selection Important

There is a specific blade for each job; however, if you are in doubt as to what blade to use and have no way of finding out, take a 6 tooth blade, and in the majority of cases, you will get by. However, the *importance* of selecting the correct blade for a job should not be under-estimated. It should also be remembered that a hack saw blade is a cutting tool, and should be treated as such, the same as one would any high grade cutting tool, milling cutter, and such. Unfortunately, one finds that, in many places a new hack saw blade is handled like an *old* worn-out file, and still, that same blade is expected to cut fast, clean, and straight, and to last indefinitely.

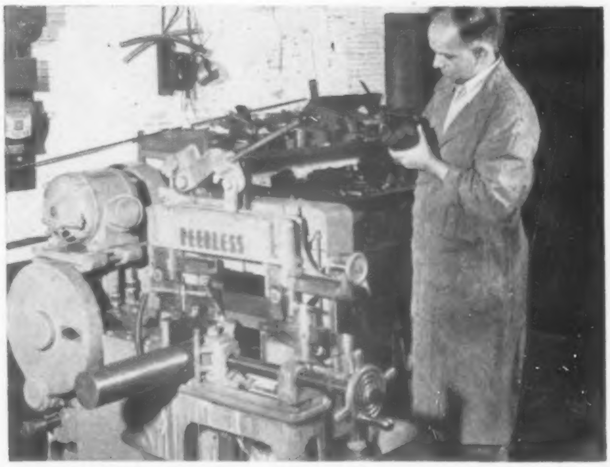
To get the expected results from a blade, the mounting of the blade in the machine is likewise important. The slack on the blade pins should be taken up, next, the blade should be properly clamped and then correctly tensioned. The tension or the direct pull on the blade will range from 600

Accurate, gang cut-off of bar stock boosts production and cuts costs.



Rugged Hack Saw machines and Tungsten or Moly blades insure fast cutting of alloy steels.

Modern Hack Saws are precision machine tools in every sense of the word.



Accurate Hack Saw machines imply accurate results. Bar stock is cut off square and true.

pounds on the smallest blade here mentioned to approximately 3600 pounds on the largest blade, with comparatively good results.

To further illustrate, take a blade that is very popular and widely used,—the 14" × 1¼", 16 Gauge. On this blade, a direct pull of approximately 1800 pounds will keep it under a fairly good tension, and a fairly heavy feed pressure—say about 275 pounds—can be used, and this should result in very good cutting. By the use of a torque wrench on the tensioning screws, one can measure the direct pull on the blade—that is, reasonably close. To get the most out of a blade, the machine must run at a proper speed (the range of speeds on the various machines varies from 50 to 160 strokes per minute) without too heavy a feed pressure.

Also, it is necessary to select a proper coolant. On soft materials, soluble oil (soap water) will do fairly well, but on extremely hard material, a cutting oil will do better work and will prolong blade life. One should see that the coolant or cutting compound is flowing on the work and to the blade at all times. This should be stressed because many operators are not very particular about having the cutting compound flowing on the blade before the blade makes contact with the work. The operator should remember that the speed selected was for wet cutting, and cutting dry the first few strokes may dull the blade.

Blades May Be Reground

To get still more out of blades, they can be reground once or twice, and in many cases, three or four times. However, it should be remembered that the teeth of the blade cannot be reset; the blade is only good as long as the set lasts. Therefore, the blade should be taken out of the machine and reground before it gets too dull, as running it dull will wear the set off rapidly.

How can one tell when the blade should be taken out of the machine for regrinding? One method is by the cutting time, another by the glazed surface of the cut. The process of regrinding the blades is quite simple and inexpensive. No high skill is required.

Most of the blade grinding machines are automatic. You place the blade in the machine, adjust it to the type of blade and tooth you are going to grind, and the feeding of the blade through the machine under the grinding wheel is done automatically. The average grinding time of a blade is from 50 to 85 teeth per minute, depending on the condition of the blade and type of blade grinding machine used. The writer understands that the price of blade grinders range from $150.00 to $450.00. One seen recently cost $270.00, and it looked good.

It is good practice, when a reground blade is placed in a hack saw machine, to take off some of the feed pressure that was applied when using a blade that had not been ground. The reground blade has a keener, sharper tooth and as there is a limit to how fast the blade can be pushed through the work, the feed pressure used on a new blade may be too heavy for a reground blade, thus shortening the blade life. In any event, proper controlling and proper guiding of the blade through the work is just as important to the blade as the quality of the blade itself. It is a known fact that one can do more and better work with the same milling cutter in a heavier, sturdier milling machine; likewise, one can do more and better work with the same hack saw blade if one selects a heavier and sturdier hack saw machine.

Lightweights and Heavyweights

With regard to hack saw machines, there are light weight machines for light, occasional sawing, medium weight machines for general purpose sawing. There are machines with the open side, or the "U" type saw frame guided by an overarm pivoting at the crank end, and some sliding up and down a pillar located just ahead of the crank. Then, there are machines with the four-sided saw frame, guided by a four-sided guide with all bearings surrounding the frame and work. These sturdier, heavier type machines are capable of amazing speed and accuracy.

There is a variety of designs and sizes of hack saw machines, both manually operated machines and the fully automatic type. With the latter type we load the machine and set the gauge for the required length and the number of cuts required. Thereafter, all cycling is done automatically, duplicate lengths of a single bar or nest of bars being cut quickly and accurately.

Noteworthy features found in the heavy duty production type hack saw machines may be summed up as follows: the rigid, sturdy design; guide or slide bearings lined with hardened and ground liners; heat treated bearing shoes; automatic oiling of all bearings; transmission gears running in oil; readily replaceable anti-friction bearings on all revolving bearings and all bearings subjected to wear; feed pressure control gauge indicating approximate number of pounds pressure on the blade at all times at any predetermined setting; cushion cylinder to counterbalance the reciprocating motion of the saw frame; automatic feeding of work to be cut into the machine, automatically duplicating lengths of single bars or nest of bars; and self contained feed units readily replaceable on exchange basis. And there are many other features that add to the ability and life of hack saw machines.

The hack saw machine of today is capable of controlling a hand hack saw blade slotting a ⅛" drill rod, or a heavy duty blade sawing a 3" round bar of X-1335 SAE steel ground shafting in 21 seconds, plus 4 seconds for cycling of the machine when cutting one inch lengths, or 25 seconds for a complete cycle, floor to floor; or a 6" square, 50 carbon molybdenum steel bar in 3 minutes and 20 seconds.

While the above figures are not being recommended for general everyday production sawing, they have been accomplished in test sawing, sawing the free machining steel. This will give some idea of the maximum results possible with a hack saw blade, if properly controlled and guided through the work.

Heads Inter-American Dep't. of A.S.A.

New York—Edmund A. Pratt has joined the staff of the American Standards Association to assume direction of its Inter-American Department. Set up about two years ago to implement a program of Inter-American cooperation in standardization, the department has established close collaboration with the national standardizing bodies of Brazil, Mexico, Argentina and Uraguay, and with technical groups in other countries interested in establishing international industrial and technical standards.

Collier Elected Director of Allis Chalmers

Milwaukee—John Howard Collier, president of the Crane Co., Chicago, and a trustee of the Illinois Institute of Technology, was elected a director of the Allis-Chalmers Manufacturing Co., it has been announced by Walter Geist, Allis-Chalmers president, following a meeting of the board of directors.

Collier fills the post left vacant by the resignation of Capt. Lester Armour of Chicago, who has been out of the country in the service of the Navy.

By O. W. Winter

The Tool Engineer Defined

With thorough training in fundamentals, plus experience, he is the key man in modern mass production

TOOL Engineering is the art and science of analyzing, planning, designing, constructing and applying the means and equipment for the mechanical production and manufacturing of industrial and consumer goods and commodities.

A tool engineer may operate under a title of the same name or any one of a myriad used in industry. If, however, his responsibility, authority or work involve him in the basic activity as defined, he is engaged in tool engineering work. The extent and complexity of that activity, and his background of education and experience to prepare him for it, determines to what degree he is or can be regarded as a tool engineer.

Otto W. Winter graduated from Ohio State University in 1929 with a Bachelor of Industrial Engineering degree. He has held important positions with several leading tool manufacturers and was a consultant on this work in Russia for two years. A past president of ASTE (1943-44) he is now vice-president of Acme Pattern and Machine Company of Buffalo.

The development of mass production of interchangeable parts and assemblies has brought about this highly developed and specialized branch of the engineering profession. And the reverse is equally true—the development of tool engineering has made possible the development and application of the economic mass production that has formed the bulwark of our material civilization. Of current importance and interest is the fact that we are winning the war because we won the battle of production. This battle of production was won by tool engineering in spite of a terrific shortage of skilled labor, a shortage the handicap of which was overcome only by tool engineering's creation of means of production simple enough to be operated by quickly trained unskilled labor.

Distinct Branch of Engineering Profession

It is high time that all concerned in industry, education and government become fully aware of what has been happening all around them and awake to the reality of tool engineering as a separate and distinct branch of the engineering profession. That leading industrialists and engineers fully realize this was amply demonstrated in the recently completed "Industry Opinion Survey of Tool Engineering Education (*The Tool Engineer,* March, 1945 and *The Iron Age,* April 12, 1945).

Basically, tool engineering covers the following ten subjects. While one who is versed in all ten would obviously be a "full fledged" tool engineer, it follows in this industrial world of specialization that expertness in only one or two subjects may be realized. Nevertheless a tool engineer in the proper sense of the word is familiar at least to a moderate degree with all ten subjects.

The Ten Basic Subjects of Tool Engineering

Primary Tool Engineering Subjects

1. Machine Shop Practice and Cutting Tool Design
   Includes: Machine Tool Design and Application, Science of Metal Cutting and the more advanced aspects of Machine Shop Practice.
2. Jig, Fixture and Gage Design and Practice.
   As related primarily to machine shop and assembly operations.
3. Sheet Metal Work and Die Design.
   Covering all types of sheet metal fabrication.
4. Forging Practice and Die Design.
   Covering all types of hot and cold forging, upsetting, extrusion, etc. with particular reference to equipment and tooling.
5. Permanent Molding Plastics and Die Castings.
   With particular reference to equipment and dies as well as secondary operations.
6. Welding Methods and Equipment.
   With reference to machine welding such as spot, butt, flash, seam projection, etc. Arc and Oxy-Acetylene welding studied primarily in connection with machine and tool applications, likewise flame cutting and flame hardening, etc.
7. Manufacturing Analysis.
   A composite yet specific Tool Engineering subject embracing the fundamentals and essential parts of cost accounting, work routing and planning, operation analysis, time and motion study, etc. The subject as approached by the Tool Engineer to find in monetary as well as practical values the best way to do the job.

Related Tool Engineering Subjects

The Tool Engineer must have a good working knowledge of these subjects, but need not be an expert or specialist in them.

1. Metallurgy and Heat Treating.
   Enough to select materials for Tools and Equipment, plan heat treating operations and understand metal cutting, forming and forging.
2. Foundry Practice and Pattern Making.
   A specialized subject not involving tooling as such to a great extent. Nevertheless must be generally understood by the Tool Engineer.
3. Machine Design and Applied Mechanics.
   While usually considered two separate subjects, they can, however, be combined for the purpose of the Tool Engineer. Fundamentals and phases applicable to tool and special production machine design should be covered.

Extensive Background Essential

It is immediately apparent that for one to comprehend and perform the functions of "analyzing, planning, designing, constructing or applying" the above subjects in a tool engineering sense, that considerable grasp and background of training in such basic sciences as mathematics, geometry, trigonometry, physics, mechanics, chemistry and the like is indispensable.

While it is true that one may perform technical work within the field of tool engineering in some clerical, subordinate or sales capacity without this background of basic science he cannot function as a *tool engineer* (analyzing, planning, designing, constructing or applying) otherwise. Nevertheless, in the nether phases of tool engineering we find many with limited background of education and experience properly performing important functions but who might be better termed "tooling technicians." Into this category fall many so-called sales engineers, tool room foremen, etc., although, on the other hand, many others of the same title by virtue of background, ability and current nature of their work must be recognized as tool engineers.

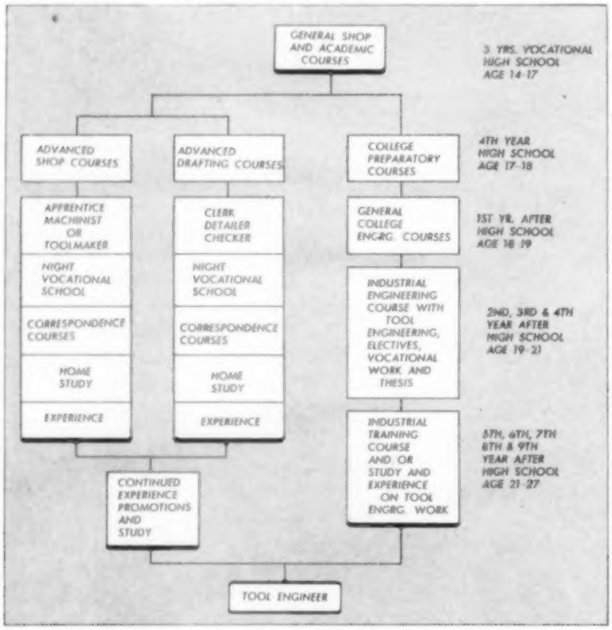


Chart showing two basic channels of development, industrial and scholastic.

Before delving into the maze of industrial titles, let us further explore the evolution and development of the tool engineer, starting with the first grade of high school. The chart shows basically 2 channels of development, industrial and scholastic. The industrial channel is split into 2 groups, those who gain their experience in the shop and those who gain it on the drafting board. While the former is preferable and more common, a combination of both is not uncommon in the four years illustrated. However, where an apprenticeship is being served, four years are usually consumed and usually the subsequent years include further shop experience as well as tool design experience. That shop experience to the point of "know-how" is indispensable is generally agreed. The amount of experience on the drawing board will vary with the nature of the tool engineer's future activity. Some remain in design work whereas some in planning, executive or sales positions rarely engage in design but confine such efforts to the conception and sketching phases of design.

Industrial Experience vs. Technical Education

The industrial channel of evolution and training probably is characteristic of the large majority of our present tool engineers. This, to a large and unfortunate degree, is due to the lethargy and over conservatism of our engineering colleges and universities in the past.

However, a number of schools have been offering courses in Industrial Engineering with tool engineering subjects covered as required or elective studies. Others have offered tool engineer electives in their mechanical engineering courses. While we anticipate that full degree courses in tool engineering will come as an inescapable evolution, the chart is laid out on a past and as-is basis.

It is generally agreed that with proper study, effort on the part of those following the industrial channel, and proper industrial experience by those following the scholastic channel, that equally good tool engineers will result. There exists, however, a wonderful opportunity for progressive schools to do a job of combining the good features of both channels. Such a course properly conducted would save years of valuable time in the typical self-made careers of most tool engineers, industrial leaders agree.

To further elucidate on the functions of a tool engineer or the functions one qualifying as a tool engineer should be able to perform, let us trace through the work involved in putting a product into production.

Analysis

The tool engineer, through his familiarity with manufacturing methods, available means and equipment, problems and potential pitfalls, is consulted in the design of the product in an effort to secure manufacturing costs as low as possible consistent with functional product design and appearance.

It is at this point the tool engineer's ingenuity is often put to test and further at this point many firms go in or fail to gain one of the most valuable services the tool engineer offers. Too often the product is dumped in the tool engineer's lap to manufacture without this valuable previous consultation and analysis.

Planning

Determining the method of manufacture, the sequence and character of the operations involved, the time involved in each operation and its cost, the general nature of the equipment required and the fashion in which all this fits into the industrial process and plant as a whole comprises the planning stage of tool engineering. It might be added that this is possibly the most important and characteristic step in the whole tool engineering process.

Proper and thorough planning may spell the difference between profit or loss on the finished product. The efficient manufacturing process or tooling up job cannot be accomplished without competent and thorough planning. To accomplish this requires decision and judgment that is acquired only by experience and a comprehensive knowledge of the subject. In this phase of tool engineering activity is included the selection of the equipment required and its basic design.

Designing

Once the basic design of the equipment required has been determined in the previous planning stage, the tooling process is ready for detailed designing of such equipment as is required. Such equipment would include machine tools, presses, special and miscellaneous machines, jigs, fixtures, dies, cutting tools, gages and measuring instruments as well as furnaces, material handling equipment and even building alterations and facilities on occasions. While it is true that the services of vendors of equipment are utilized at this stage to a large degree, there are invariably the special adaptations, work holding and gaging devices, etc., that require detailed consideration at this point.

Many tool engineers are engaged in the full time capacity of tool designers or in charge of tool design departments. The fully competent tool designer should have the same broad and comprehensive knowledge of manufacturing methods as does the tool engineer who functions in the previously outlined planning phase of tool engineering.

Constructing

In the actual construction of the equipment and tooling used for production the tool engineer is involved in its tryout and "mothering" it through the "bugs" and unforeseen diffi-

ca[illegible]es that almost invariably occur. At this point those in charge of the construction of such equipment are often called on to exercise tool engineering judgment and decision as well as the designer and the planner.

Broad Responsibility

The actual application of the mechanical means of production is as often as not left up to the tool engineer or his department. Frequently enough the actual mechanical operation and maintenance may also remain his responsibility. The technical responsibility of the tool engineering process is in reality not ended until the products reach the shipping room. In the interim the functions of final inspection and assembly still come within the scope of the tool engineer.

Obviously in this broad coverage of activity a host of industrial titles can be covered. While many firms are increasingly using the title "tool engineer" or "chief tool engineer" as the head of the department or group of departments (planning, tool design, tool room, time study, machine repair, etc.) covering such activity, there is not as yet any universal use of the title. For example, in the automotive industry such an individual is called the "master mechanic." On the other hand in some sections of the country a master mechanic is a sort of chief machine repairman, hardly a tool engineer.

Lastly it must be borne in mind that in small organizations the functions of tool engineer might be covered by even the president of the concern. Consequently with our fingers crossed we hesitatingly and apologetically offer the following attempt at a clarification of tool engineering titles in industry.

(A) A fully competent tool engineer may carry any one of the following titles:

1. Chief Tool Engineer or Master Mechanic
2. Tool Engineer
3. President
4. Vice-President
5. Vice-President in charge of manufacturing
6. Vice-President in charge of engineering.
7. General Manager
8. Works Manager
9. Plant Manager
10. Factory Manager
11. Superintendent
12. Division Superintendent
13. Chief Tool Designer
14. Tool Designer, Die Designer
15. Tool Room Foreman, Die Room Foreman
16. Process Engineer
17. Production Engineer
18. Manufacturing Engineer
19. Industrial Engineer
20. Sales Engineer
21. Sales Manager
22. Estimator
23. Time Study Engineer
24. Technical writer or editor
25. Machine Tool Buyer

ETC.

(B) A "tooling technician" could carry any of the following titles:

1. Foreman (Production Dept.)
2. Tool Room Foreman, Die Room Foreman
3. Tool Maker, Die Maker
4. Tool Trouble Man
5. Estimator
6. Time Study Man
7. Metallurgist
8. Plant Engineer
9. Maintenance Engineer
10. Service Man (Machine Tools)
11. Salesman (Machine tools, cutting tools, etc.)
12. Rate Setter
13. Operation Sheet Writer.

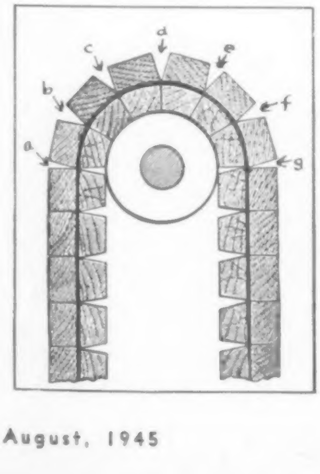
ETC.

As one can gather from the foregoing, tool engineering in its entirety encompasses an extremely broad and involved field. In its technical aspects it is related to mechanical engineering, in its management aspects it is related to industrial engineering, but it is only related and industrial leaders disagree on that relation. Actually it stands in a sphere of engineering activity separate and distinct, as the majority of industrial leaders do agree. It is more correct to say it is wholly a part of either of the foregoing types of engineering than it is to say that accounting is wholly a part of mechanical engineering. To one whose experience and familiarity with the work and requirements of tool engineering permits him to comprehend its nature, content and importance, there is no confusion on this point.

Effect Of Belt Thickness On Pulley Speeds

While the accompanying illustration appeared in Cooper's "Use of Belting" nearly 50 years ago, it is reproduced here because it so clearly shows the action of a thick belt on a small pulley. It is entirely applicable to modern belting installations.

By means of stiff and inelastic blocks of the shape indicated, the illustration shows the change in length that is continuously going on in a belt as it passes around a pulley. The spaces a, b, c, d, e, f, and g, added together, equal the total stretch of the outer belt fibres. At the same time, the inner fibres are compressed by a similar amount, the blocks "closing up" as shown. The heavy central black line is the "neutral axis," which is the only portion of the belt that does not change in length.



This is an important factor, and the illustration makes plain the reason why belt thicknesses should always be considered when computing pulley and belt speeds for machine tools. The old rule which says that belt speed is directly proportional to pulley diameter is not correct. For exact computations use the following formula: $n = N\frac{(D + t)}{(d + t)}$, in which: n = r.p.m. of driven pulley; N = r.p.m. of driving pulley; D = diameter of driving pulley in inches; d = diameter of driven pulley in inches, and t = thickness of belt in inches.

Or, eliminating the algebra and putting it into words, we have this simple rule: Add the thickness of the belt to the diameter of the driving pulley, both in inches. Multiply by the r.p.m. of the driving pulley. Then divide by the sum of the belt thickness and diameter of driven pulley, both in inches. The result will be the r.p.m. of the driven pulley.

As a matter of fact, this principle is applied in Vee Pulley, variable speed transmissions, where the belts are actually made up of blocks and where speed variations and ratios are controlled to a nicety.

W. F. Schaphorst, Newark, N.J.

By E. A. Cyrol

Tool Design—With Control

Good tool design alone does not bring efficient production. There must also be tool control.

THE tool designer may spend much time in determining and specifying the correct angles and radii for the cutting tools to be used in the shop, but, if there is no tool control, all the effects of proper design will be lost after the first dulling of the tool. In some cases, even sooner than that.

Although tool designers may consider tool control outside of their scope of responsibility, they should be sufficiently interested in their designs to attempt, at least, to protect them by advising management to install tool control in the shop. The tool engineer should go even further. He should insist that the tool control scheme include control over the regrinding of the tools, to the original drawings, so that the most effective combination of rakes, clearances and well formed cutting edges is maintained until the tool is thoroughly used up. Good design is not enough in itself: the design must be maintained throughout the life of the tool.

E. A. Cyrol, **was graduated in M.E. from University of Michigan. He gained practical experience with Murray Corporation of America, and with Packard Motor Car Company, Aircraft Division, before joining McKinsey, Kearney & Co., Management Consultants, as consulting engineer.**

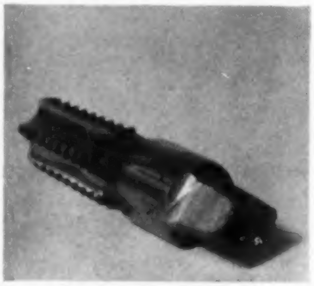


FIG. 1. Hand grinding ruins tap.

If machine operators are allowed to regrind tools, it is a foregone conclusion that they will be short lived. In case of doubt, a trip through the shop will be convincing. Work bench drawers, tool chests, lockers, scrap bins—all will provide examples of how tools should not be ground. The illustrations shown herewith, were picked up on such a tour. Figure 1 shows a tap the worse for its regrinding experience. The flutes have been misshaped by off-hand grinding; the cutting angles no longer resemble the intended angles; even the shank and square have not retained their original forms.

The boring bar shown in Figure 2 had a chip breaker ground in the tungsten carbide insert. When it dulled, the operator attempted to regrind the chip breaker, but off-hand grinding on the wrong kind of wheel proved disastrous.

FIG. 2. Centralized grinding would have saved this boring bar.

Operators cannot be expected to maintain proper clearances on the cutting tools with free hand grinding. The facing tools found in the scrap heap and shown in Figure 3 have insufficient clearances, among other faults, which helped to bring on early failure. The tops of the carbide inserts show evidence of unconventional grinding that the designer would not specify and which entirely cancelled their usefulness.

It does not matter what advanced method of back-off (See *The Tool Engineer,* March 1945, pp. 11) might have been used on the reamer shown in Figure 4 to lengthen its tool life. A machine operator used his own method of sharpening the tool shown, and whatever length of tool life the designer expected is gone. So is the center and any opportunity for salvage.

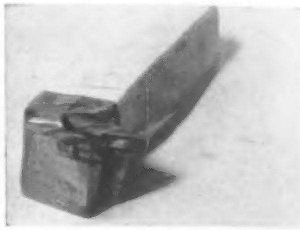


FIG. 3. Expensive carbide tool junked by wrong grinding.

If the management is still unconvinced that a system of tool control, which would allow the tool engineer to specify tool regrinding, is necessary, the tool engineer might make up an estimate in dollars and cents of the original worth of the tools found ruined throughout the plant.

The standards division will be able to provide time estimates for machine down-time due to tool grinding. This time varies, usually 3% to 6%. That may amount to $30.00 per day for each one hundred operators in the shop.

Of course, the fewer tools that meet the end of these shown in the illustrations, the smaller the tool inventory needs to be. A smaller grinding wheel inventory will also serve because wheels used by skilled operators under a centralized tool grinding arrangement last longer.

Finally, the tool engineer should advise tool control and centralized tool grinding to insure that the tools used in the shop will have in them the design which was intended for them on the drafting board. He is held responsible for tool performance and tool life; therefore he should insist that management do its share in maintaining the tools as he designs them.

FIG. 4. Free hand grinding destroys reamers.

Guide to Anti-corrosion Procedure

As an aid to industry, in rust prevention of goods and equipment held in storage for, or shipped overseas to the Armed Forces, the F. E. Anderson Oil Co., Portland, Conn., has prepared a "Guide to the Anti-Corrosion Procedure of P.S. 300-4," revision of November, 1944.

This synopsis of an involved specification has been developed through cooperation with Government agencies, and covers about every contingency in rust prevention, as well as every specified procedure for U.S.A. specification rust preventatives. It has a further interest for industry in that the procedure and methods are entirely applicable to postwar rust prevention. It is available on request.

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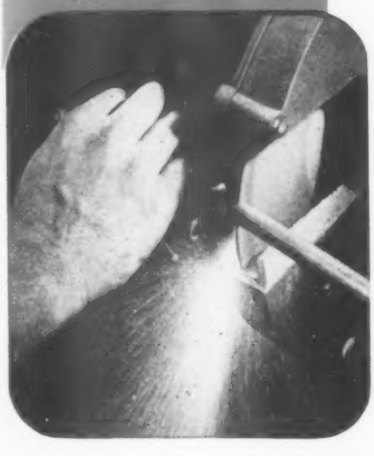

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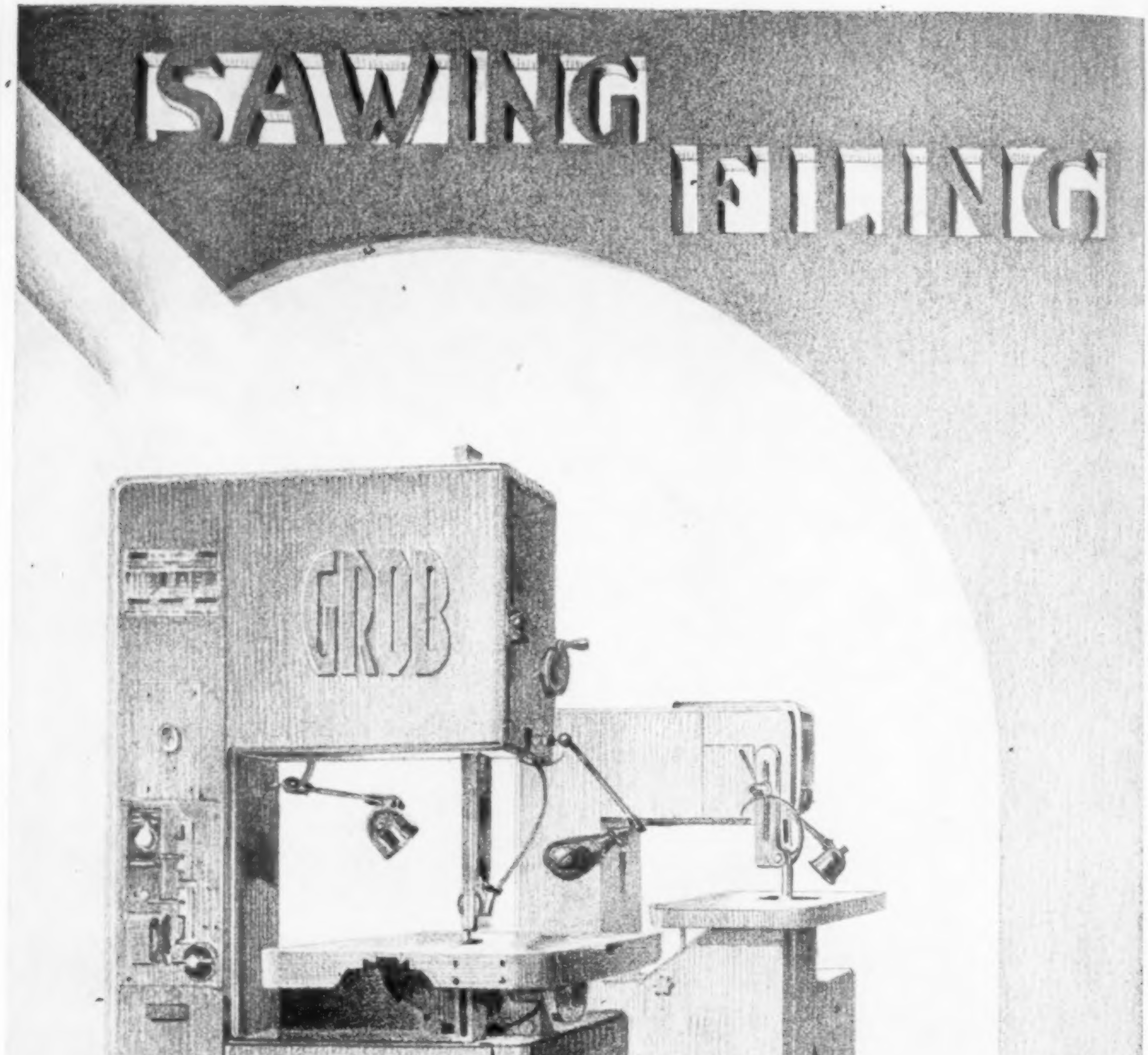
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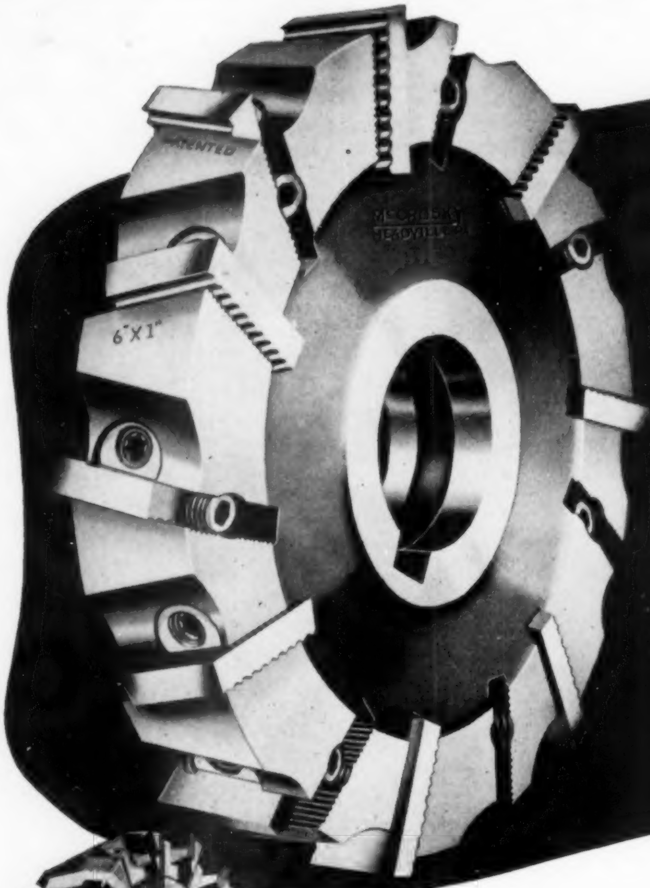

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● You can operate safely at higher feeds and speeds,—get more pieces per day, at lower cost per piece, with McCrosky Jack-Lock Milling Cutters. Originated, perfected and available only from McCrosky,—Jack-Lock Cutters hold the blades rigidly and solidly, yet permit easy release of the blades without hammering. Fine pitch back-up screws assure accurate and uniform blade adjustment. Consequently a minimum of blade stock is lost in regrinding, a particular advantage when carbide tips are used.

Specify McCrosky service-proved Jack-Lock face mills, shell-ends, half-side, staggered tooth, and special multiple operation tools for use in your plant,—and get all the design, construction and operating advantages only McCrosky Jack-Lock Cutters can give you. Bulletin No. 16-M gives full details. Send for a copy.

McCROSKY TOOL CORPORATION
MEADVILLE, PA.

COST CUTTING TOOLS

Designers and Manufacturers of
Jack-Lock MILLING CUTTERS
Block Type BORING BARS
Wizard CHUCKS AND COLLETS
Super Adjustable REAMERS
Turret TOOL POSTS

A few simple rules to conserve carbide tools

FIRTHITE
FIELD SERVICE POSTERS
are available for display in your plant

The conservation of carbide tools through proper handling and correct usage is essential not only in war time but at any time for best production results and low operating costs.

These Firthite field service posters will help remind your plant operators in simple, easy-to-take, understandable manner, of the right way to make carbide tools do their utmost.

Fill in and mail the coupon for your set of these free, 17" x 22", four-color posters.

FIRTHITE

Firth-Sterling
STEEL COMPANY
OFFICES: McKEESPORT, PA. • NEW YORK • HARTFORD • PHILADELPHIA • PITTSBURGH • CLEVELAND • DAYTON • DETROIT • CHICAGO • LOS ANGELES

FIRTH-STERLING STEEL CO., Dept. TE—McKeesport, Pa.

Please send us without obligation on our part______sets of Firthite Field Service Posters which we wish to display in our plant shops.

NAME____________________ TITLE__________

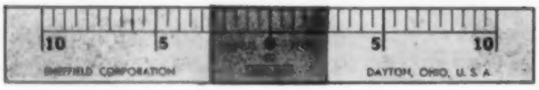
COMPANY______________________________

ADDRESS______________________________

"The Job's Easy-
I KNOW WHERE I AM!"

"LAST WEEK I was grinding to a tolerance of .002". It was a cinch with a gage like this!"

"THIS WEEK I'm grinding to .0005", four times as close—sounds tough, but it isn't ... THE SPREAD IS THE SAME!"



SURE, the job *is* tough if you don't know "where you are". But, higher amplifying indicating gages used right at the machine make tough jobs easier. They tell you where you are and what you're doing.

RESULTS—a better operator producing quality work—and more of it—at lower cost and with far less scrap and rework time. Every piece is checked, starting with the first. Assembly costs are reduced. The gage tells whether the machine is going out of adjustment—whether the tools are getting dull and if the operator is doing anything wrong.

"CHEK WITH SHEFFIELD"—Visual gages in six different amplifications, Precisionaires of four different amplifications with Airsnap or Air Spindles, Electrigages, Dial Indicator Gages, Thread Checking Instruments and many others, make possible the selection of the right instrument for use at the machine for process control of both internal and external dimensions.

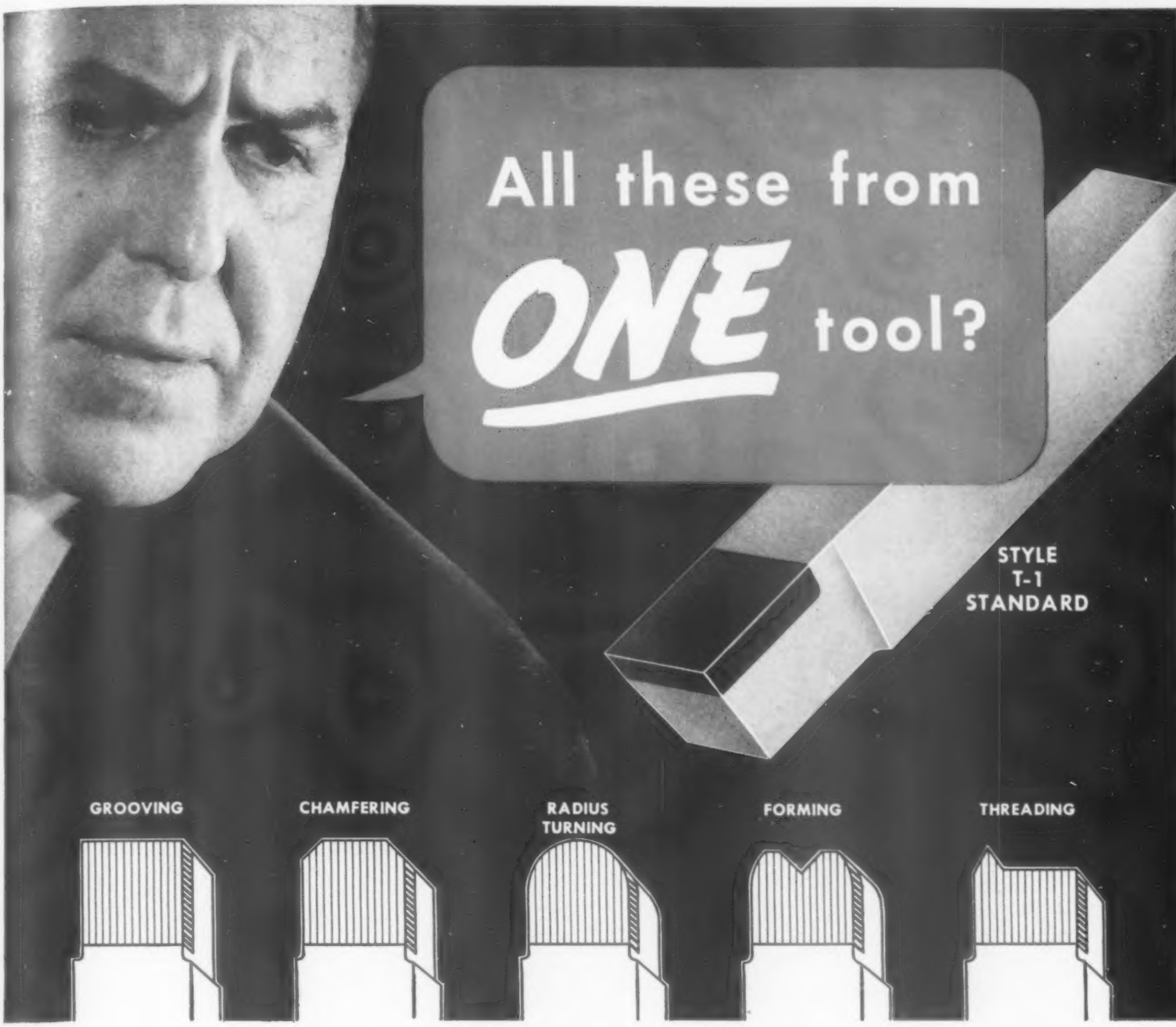
Write for Engineering Data and a Demonstration in your plant

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

SHEFFIELD MASTER CRAFTSMEN



You'll probably never need to make one "lone" tool do the work of six different tools but, if necessary, STANDARD Carboloy Tools *could* be quickly and economically adapted in this way to a wide variety of operations. The above example indicates their adaptability.

With Standard Carboloy Tools in your crib, you're prepared to quickly tool-up 60% to 80% of all turning, facing and boring operations. Available in 10 styles (Style T-1 shown), all commonly used sizes, and tipped with grades for cutting steel, cast iron, non-ferrous metals and non-metallics.

Priced as low as 70c—less than the cost of ordinary tools in many sizes—standard Carboloy Tools give you all the benefits of carbide use at minimum tool investment cost. Write for catalog GT-175R.

CARBOLOY COMPANY, INC., 11124 East Eight Mile St., Detroit

Sole makers of the Carboloy Brand of Cemented Carbides

CHICAGO • CLEVELAND • HOUSTON • LOS ANGELES • MILWAUKEE
NEWARK • PHILADELPHIA • PITTSBURGH • THOMASTON

Also stocked and sold by Leading Mill Supply Distributors, coast to coast.

TRADEMARK

Standard Carboloy Tools Are ADAPTABLE to

60%-80%

of your carbide tool needs.

Available in 10 styles.

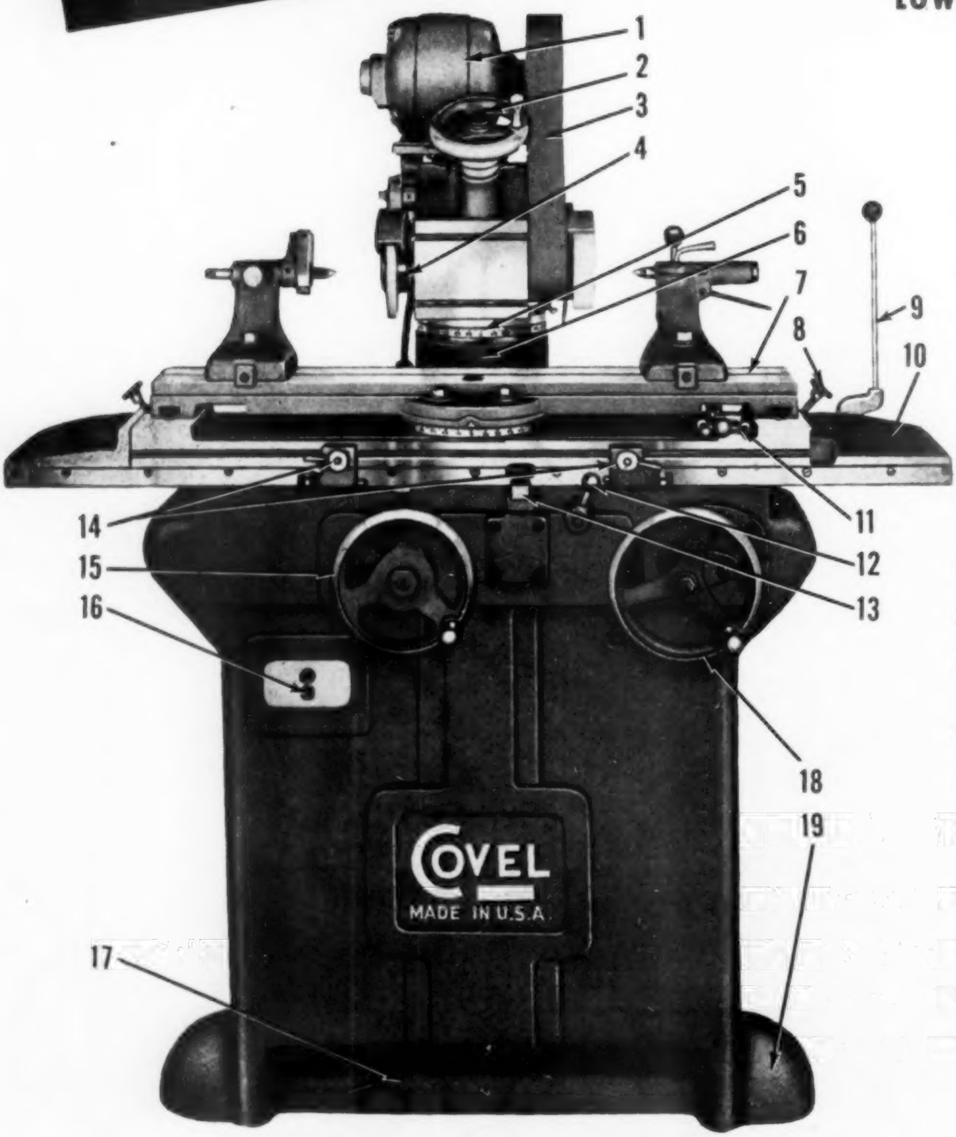
Priced as low as 70c each.

STANDARD CARBOLOY TOOLS

(TRADEMARK) CEMENTED CARBIDE

19 Reasons Why COVEL NO. 12 Universal Cutter and Tool Grinder MEETS TODAY'S DEMAND — and TOMORROW'S

FOR SPEED, ACCURACY, LOW-COST PRODUCTION



1. ¾ H. P. spindle drive motor conveniently located, 3-speed V-belt pulley.
2. Elevating hand wheel with floating dial.
3. Belt guard splits for easy opening to change speeds.
4. Quill-type ball bearing spindle. Large, rugged and accurate.
5. Head swings on vertical adjustable column graduated in degrees.
6. Telescoping Metal Dust Guards.
7. Top table adjustable for taper grinding. Can be revolved 180° to increase capacity 3".
8. Quick-acting End Clamps.
9. Hand-rapid table traverse lever is removable, adjustable, convenient.
10. Table and cross-feed saddle move on balls.
11. Fine screw adjustment for taper.
12. Lock for sub-table (saddle and column locks also provided).
13. Table stops slide back, permitting dogs to pass.
14. Fine screw adjustable table dogs.
15. Large graduated cross feed hand wheel with floating pointer.
16. All electric switches are convenient to operator.
17. Toe-room in front of base for operator comfort.
18. 2-speed hand wheel for longitudinal table travel.
19. Cover plates over hold-down bolts.

GRINDING MACHINERY SINCE 1874

COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICHIGAN U. S. A.

Pea-Size to Cartwheels

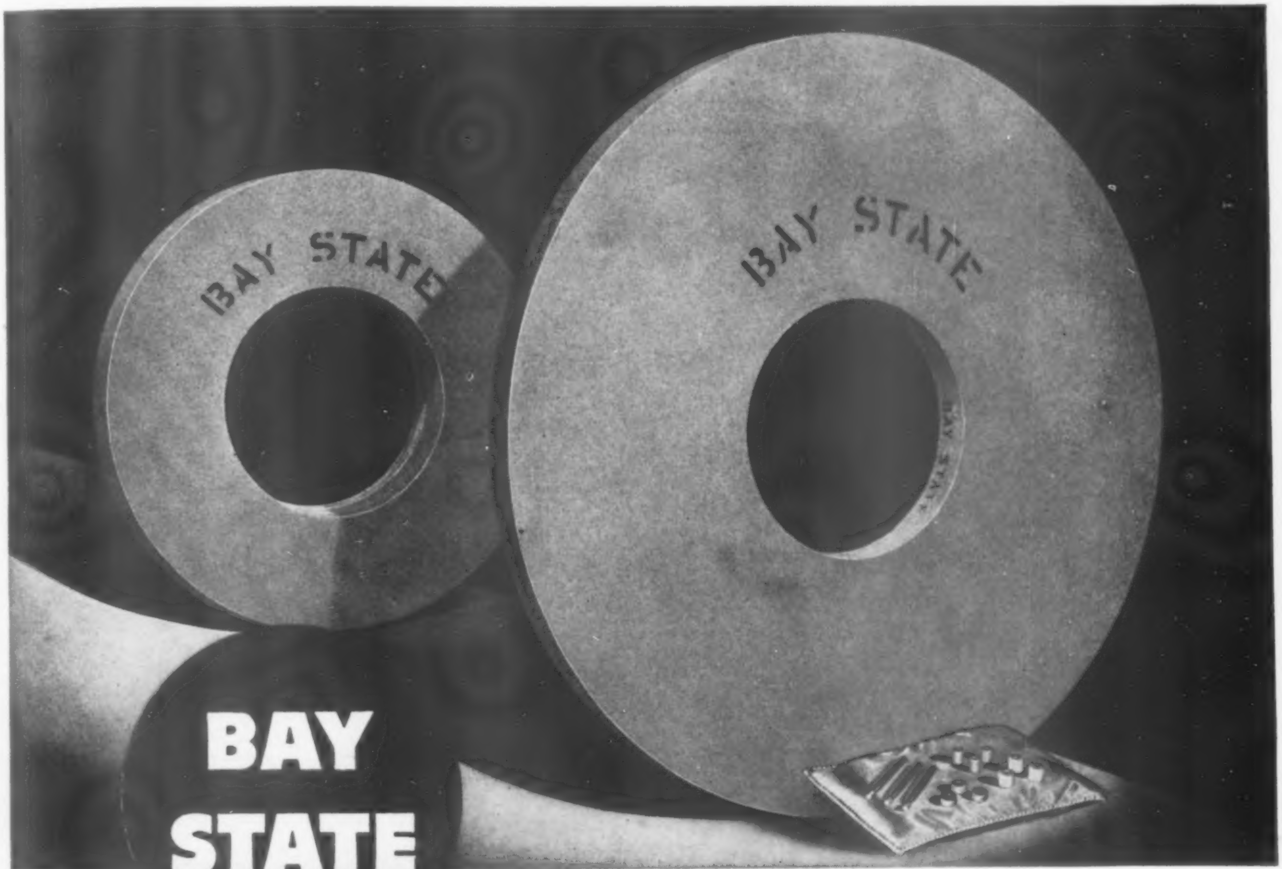
Whether you're looking for a grinding wheel the size of a small pea . . . or even smaller . . . or a 42″ crankshaft wheel . . . you can find it in the Bay State line.

And whatever *specifications* you're demanding . . . in respect to bond, grain, grade, shape or structure . . . a Bay State product can be provided to fill the bill—the first time and *whenever* you require those identical specifications.

Bay State's exclusive "fractional grading", "controlled porosity" and other features make it possible to achieve greater accuracy in meeting specifications on the *original order* and duplicating them exactly on each *re-order.*

Write us for literature on the types of grinding wheels you use.

BAY STATE ABRASIVE PRODUCTS CO.
9 Union Street, Westboro, Mass.



ABRASIVE PRODUCTS

Top Performance Consistently Duplicated

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS · MOUNTED WHEELS AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS AND CYLINDERS

For Victory Today- Prosperity Tomorrow-

LOOK TO PLAN-O-MILL

For exceptional speed, accuracy and finish—at a saving of money, metal and manpower—look to Plan-O-Mill!

Plan-O-Mill provides a *better* method of form and thread milling. Plan-O-Mill offers outstanding rapid-production features, including General Electric's Thy-mo-trol for separate and complete control of feed-in and feed-around. Plan-O-Mill requires a minimum of skill to operate, a minimum of operator attention.

Shown above are typical examples of Plan-O-Mill production applications. If your war or post-war products involve internal or external threading or cylindrical forming, replace obsolete, wasteful machines with Plan-O-Mill. Contact your machinery dealer or write direct.

First

PLAN-O-MI

FIRST to install General Electric's remarkable new Thy-mo-trol—electronic feed control!

FIRST planetary to mill external threads with standard multiple thread cutter!

FIRST planetary to coordinate feeds and speeds!

FIRST to provide absolute control of feed-in!

THREAD AND FORM PLAN-O-MILL MILLING MACHINES

PLAN-O-MILL CORPORATION

1511 E. EIGHT MILE ROAD • HAZEL PARK, MICHIGAN

THREAD AND FORM PLAN-CO MILLING CUTTERS

Procedures Work Being Rushed

Months of preliminary work are coming to fruition in the preparation of procedures to implement the Constitution and By-Laws and organization charts of the American Society of Tool Engineers.

This was borne out at the meeting of the Organization Progress Committee with the National Executive Committee and representative National Committee Chairmen, held July 7-8-9.

Chairman Ray H. Morris of the Organization Progress Committee, upon conclusion of the meeting, said, "While it will be several months before acceptable procedures will be available for distribution to Chapters, every effort is being made to develop them rapidly. Based on information and recommendations received from Past National and Chapter Officers and from those who at present hold office in Chapters, many sections of the procedures are nearing completion.

Balloting Instructions Outlined

"As an example, one section will contain instructions and recommendations concerning affiliations of our Chapters with other technical societies and engineering councils. Next, on the alphabetical list, is a section on balloting which will outline instructions and recommendations for elections and voting of all kinds by the National Society and by Chapters.

"Sections are being prepared, outlining the way and manner in which meetings of the Board of Directors shall be conducted, the order of business which will be followed, and the type of reports which should be submitted, courtesies due speakers and guests at Chapter meetings, suggestions for the order of events at meetings, and the duties and responsibilities of Chapter officers and Chapter committees.

Delegation of Duties Described

"These, and a great many other details, including the duties and responsibilities of National Officers, National Committees, the House of Delegates and types of membership are also covered.

"Many sections of the procedures will be given over to an effective delineation of the work to be done by Chapter Committees, co-ordinated with National Committees of like designation, together with voluminous suggestions from the National Program Committee, the National Standards Committee and others.

"This manual of procedures will be designated as "Division 4" and will be processed and sent to the Chapter officers when completed and approved.

The Committee which has been working so assiduously, with the co-operation of hundreds of members of the Society, also includes the following: W. J. Frederick, I. F. Holland, G. J. Hawkey, A. L. Potter, W. B. Peirce, A. M. Sargent, and President C. V. Briner and National Secretary A. M. Schmit as Ex-Officio Members.

Inventors Urged to Aid War Department in Hastening V-J Day

Washington, D.C.—In its efforts to hasten the defeat of Japan, the War Department has appealed to inventors to solve problems confronting the Army.

C. F. Kettering

Released through the National Inventors Council, Department of Commerce, Washington 25, D.C., under the chairmanship of Charles F. Kettering, Vice-President in Charge of General Motors Research, the list includes applications to numerous fields of endeavor. Descriptions of the suggested inventions, illustrated with sketches, should be sent to the National Inventors Council who will forward promising ones to the War Department. The latter agency communicates directly with those submitting acceptable inventions.

The native resourcefulness of Tool Engineers, already accelerated by their wartime accomplishments, will find additional outlet in overcoming many of these problems, some of which have been partially—but not entirely satisfactorily—solved:

Problems Are Varied

A relatively simple gage to measure the impulse of explosion blast, positive and negative phases to be determined separately but concurrently. It would be desirable if the duration of each phase could be determined in some simple manner.

A light, detachable rock drill bit grinder for resharpening detachable bits. Capacity approximately 20 bits per hour and weighing 200 to 250 pounds.

Means of controlling fires in fighting tanks for a sufficient period of time to evacuate personnel. The process should not be injurious to personnel and should be manually controlled and operated. These are largely ammunition fires wherein the oxygen to sustain combustion is self contained.

A simple, practical and accurate field method of measuring the moisture content of oxygen in the commercial cylinders or in the oxygen containers of an airplane from which the aviator draws his breathing oxygen.

Increase Engine Life

Means for increasing life of standard automotive or stationary engines when operated on 91 octane fuel.

The use of anti-stripping agents with cut back asphalts to permit effective coating of wet aggregates. "Cut back asphalts" are asphalt cements, the viscosity of which has been reduced by the addition of a volatile substance, such as gasoline, kerosene, or naptha.

Method of stabilizing an aerial camera or of indicating the vertical of the camera at the instant of exposure to within 5 minutes of arc.

Reduction of reflection from glass surfaces by durable coatings suitable for field application. Reflection is one of the most common ways of giving away position of our troops and equipment to enemy observers.

Color Recognition

Optical method for determining the difference betwen an artificial green and a natural green.

Destruction and removal of obstacles to landing operations. Obstacles may be visible or concealed and may be off or on shore.

Location and destruction of concealed enemy emplacements, pillboxes and similar strong points.

Methods of protecting our vehicles from the effects of enemy land mines.

Improvements in tank vision devices and control instruments. There is special interest in reducing space requirements and improving performance of gyroscopic compasses.

Ingenious and simple decoy devices for purposes of confusing and misleading enemy.

Technical data as to strategic enemy targets such as chemical plants, explosive plants, power plants, etc.

A voice-transmitting gas mask which would permit the wearer's voice to be heard with clarity.

Clothing giving protection against falling pieces of white phosphorous.

Colored smokes using readily available pigments for obtaining the desired color.

Methods of generating stable artificial fogs, and methods of dispersing artificial and natural fogs.

Flame Thrower Defense

Protection against flame throwers. The wire mesh screens, commonly suggested are ineffective against modern flame throwers.

Design of life vest which automatically inflates and turns the man on his back when he is thrown overboard by concussion and is unconscious.

Noiseless hand generator with a lightweight flashlight. The generator should be pumped at a rate of 40 revolutions per minute, and the light should be continuously brilliant and start on the first pump.

An inexpensive metal suitable for Quartermaster tableware; one having requisite strength, freedom from corrosion by food acids or alkalis; durability and attractiveness.

Suitable substitute for rubber for insulating wire; should be flexible and durable.

Detectors of enemy personnel who may be approaching (unseen) on jungle trails or fences or similar barriers.

(*Continued on next page, column 1*)

A•S•T•E NEWS

A Publication of the American Society of Tool Engineers
1666 Penobscot Bldg.
Detroit 26, Michigan

Editor, Adrian L. Potter
Associate Editor, Doris B. Pratt

"INVENTORS—"

(Continued from page 65, column 3)

Sonic or supersonic means or methods of signalling in the field.

Improved means or methods of signalling the identification of ground troops to friendly airplanes and vice versa.

Improved traction devices for wheeled vehicles of all types. Note: Present chains and other devices are cumbersome, inconvenient to apply and remove and lack sufficient traction.

Tracks for tractors and other motorized equipment which will operate efficiently in snow and extreme cold.

Improve Air Cleaners

Better air cleaners for use on tank engines and the like; more effective than present cleaners and requiring less maintenance.

Methods of quick-action water-proofing for enabling vehicles to ford water several feet deep, without stalling engines.

Storage battery not adversely affected by very low temperatures.

Detectors for locating non-metallic land mines.

Equipment or methods for removing land mines rapidly from mine fields without injury to equipment or personnel.

Methods of rust-proofing ferrous metals, which are more durable than present methods.

New absorbents for carbon monoxide or catalysts or other means for oxidation of this gas to render it non-injurious to personnel.

Means of defeating darkness to permit vision at night without aid of visible reflected light. Note: Probably involves an apparatus to translate infra red rays to visible light.

Means of long distance communication outside the present scope of radio and not restricted by line-of-sight projection.

Additional simple non-toxic processes for darkening aluminum and other metals; to make them non-reflectant to light.

Stag Picnic

Rockford, Ill.—Members of Rockford Chapter gathered June 9 at Svithiod Park for their Annual Stag Picnic.

The afternoon was filled with many activities and contests, members Sutton and Ramsey winning the bait casting competition, Rigeman, Lustig, and Crandell taking the honors in golf driving, while Hawkinson and Johnson were lucky at horseshoes. The East Siders trounced the West Siders again in the annual softball game between these two teams.

An able MC, Kenneth Lund distributed the attendance prizes awarded after dinner.

Among out-of-town guests were Regional Director Frank Martindell, John Kinsey, and Frank Cook of Chicago, Detroit Chapter First Vice Chairman W. B. McClellan, and Fred Paatsch of Milwaukee.

Ethics In Engineering

By S. B. PAUL, Editor
Schenectady Engineering Council Bulletin

[Reprinted through the courtesy of a contemporary publication.]

The engineer, like members of other professions, must observe certain rules and ethics in the prosecution of his professional duties. Such conduct will be his assurance of the necessary continued respect of his client, employer, and employees. Many well meant attempts have been made to clarify engineering ethics by listing them in rigid form. Basically these rules are centered around honesty and unharmful practice. The engineer is engaged for his knowledge and it is expected that he will apply it unlimitedly—that his computations will be accurate, his ideas sound.

Governed by Natural Laws

Fortunately, most engineers either consciously or unconsciously have reverential respect for the absolute natural laws which form the basis of the science of their particular field of engineering. These laws form the nucleus of their profession and around them the structure of their academic education was formed. Therefore, it seems both right and agreeable to the engineer that the application of the principles of these laws should bring definite and uniform results. The respect for these principles goes a long way in preparing the engineer for his obligations to society, because it makes it natural for him to expect right results from all his efforts, either in or away from his business.

Professional Status Achieved

Today more than ever the Engineering Profession is proving its importance to our very existence. Although engineering has only enjoyed a professional status for a relatively short period, it is without a doubt now commanding the respect and dignity due it. It is, therefore, only fitting that conscientious engineers take pride in their profession and be aware of its ethical obligations. Charles Dickens rightly pointed out a general rule for this when he wrote: "It is well for a man to respect his own vocation, whatever it is, and to think himself bound to uphold it, and to claim for it the respect it deserves."

In general, trained engineers in all fields may be classified as research men, educators, practicing engineers, or business men. Each group is bound to uphold the ethics of the profession.

Cognizant of Ethics

The research man works extremely close to the principles of his profession and is more apt than anyone to observe the literal interpretation of ethics in his relationship with others. The educator, like the research man, works close to the principles of his profession, but usually has a greater appreciation for the ethics necessary to support the high status of his profession.

The practicing engineer is usually primarily concerned with design and production and is strongly called upon for a combination of necessary technical knowledge and "educated horse sense." This man is ethically bound to take the initiative by unlimitedly using his knowledge for the benefit of the client or employer and it is his duty to observe the necessity for economy and safety and to incorporate these factors in his work.

The trained engineer who ultimately becomes a business man can never lose appreciation for the engineering profession. Well-founded respect for engineering principles will enable him to conduct other work along similar lines of order and soundness, and his knowledge will equip him with keen appreciation for practical considerations.

The engineer is privileged to further the cause of his profession by supporting his respective Engineering Society. These various engineering societies have been greatly responsible for elevating engineering to a professional status and will continue to advance the profession if active support is forthcoming. These societies, in turn, have made the engineer conscious of the necessity for ethical considerations as an integral part of his practice.

New Illinois Chapter Receives Charter 72

Aurora, Ill.—"Industry as such has a very definite stake in the American Society of Tool Engineers," Dr. H. M. Garsson, President of Batavia Metal Products, Inc., assured the members of ASTE gathered June 5 for the chartering of Fox River Valley Chapter—the 72nd and newest Chapter of the Society.

Dr. Garsson, himself one of the new group and principal speaker of the evening, emphasized the fact that his company took on many war production jobs in full confidence that the Tool Engineers of his staff would find answers to the problems involved. He related his experience in executing an Army order for the manufacture of wooden pipe—something he had never even seen before; how his Tool Engineers, with a sample piece of the pipe before them, built machinery and tools to do the job on a more rapid production basis than had been possible heretofore.

Master of Ceremonies for the evening, Regional Director Frank Martindell of Erie Basin Products, Inc., Chicago, introduced President C. V. Briner of Cleveland, who gave an inspirational talk reviewing the background of the Society.

Officers Elected

Executive Secretary Adrian L. Potter of Detroit spoke briefly, complimenting the Chapter on the caliber of its members, many of whom are company executives, including several presidents, after which he conducted the election of Chapter officers: Chairman, Thomas L. Kings, Chief Tool Designer, Austin-Western Company, Aurora; First Vice-Chairman, Herbert J. Braun, Carbide Tool Engineer, Kennametal, Inc., Chicago; Second Vice-Chairman, G. M. Waller, Chief Engineer, Burgess-Norton Manufacturing Company, Geneva; Secretary, Roy G. Frogness, Chief Engineer, Pines Engineering Company, Inc., Aurora; and Treasurer, Carl R. Moody, Owner, Chas. J. Moody Tool Works, Elgin.

After administering the oath of office to this group, President Briner presented the charter to Chairman Kings who accepted in behalf of the Chapter.

The 59 initial members represent 33 companies in 14 communities, including Joliet, Aurora, Batavia, Geneva, St. Charles, Elgin, Crystal Lake, Algonquin, Woodstock, Sycamore and others.

Keen interest was evident among the more than 100 who attended the charter ceremonies at the dinner meeting.

ASTE Seeks Addresses Of 293 Lost Members

Two hundred and ninety-three Tool Engineers—all members of ASTE—are out of touch with the Society, its activities, its services, its publications, and their Chapters. Perhaps one of them lives next door to you, or around the corner, or works for your company. We don't know—neither does the Postoffice Department.

Because of the nature of the work engaged in by many of our members during the war, and the entrance into and exit from the Armed Services by large numbers of our younger men, mail cannot keep pace with their peregrinations. Frequently they fail to leave forwarding addresses at their last-known residences or business connections, or forget to notify us of their new locations.

If you know the whereabouts of any of those listed below by Chapters, please forward the information to the American Society of Tool Engineers, 1666 Penobscot Building, Detroit 26, Michigan:

AKRON, No. 47

Darts, Leo M.
Davies, David J.
Dunmire, Robert W.
Dusenberry, Thomas J.
Kingsley, James E.
Krumbach, Ronald W.
Miller, Karl H.
Sandusky, William E.

ATLANTA, No. 61

Biddlecombe, Robert A.
Brown, Clifford A.
Ealy, James W.
Felts, Andrew Paul
French, Vernon L.
Harris, George E.
Hill, Cecil E.
Horvick, Ernest W.
Martz, Willis A.
Morse, Austin V.
Ravenscroft, Clyde E.

BALTIMORE, No. 13

Bridges, Clifford A.
Collins, Charles A.
Ohnmeiss, Cornelius
Richards, Franklin M., Jr.
Shibles, Ralph J., Jr.
Talbott, John C.

BINGHAMTON, No. 35

Alsman, James Daniel
Freeman, Fred E., Jr.
Livingston, Arthur L.
O'Reilly, Richard J.
Smith, Gerald F.

BOSTON, No.33

Broderick, Chester H.
Chamberlain, Robert J.
Hsu, Shao Ti
Jones, Nathaniel B.
Lund, Jack S.
Marquardt, Arthur C., Jr.
Natanson, Julian S.

BUFFALO-NIAGARA FRONTIER, No. 10

Beals, Robert N.
Cordova, Joseph F.
Davenport, John
Eberlin, Don H.
Kopczynski, John F.
Oishei, Julian R.
Pitzonka, Albert C.
Stegner, Elwood F., Jr.
Watt, James A.

CHICAGO, No. 5

Cwick, Gene V.
Nelson, Thomas

CINCINNATI, No. 21

Dickason, Howard M.
Faber, John H.
Johnston, William J., Jr.
McLary, Maurice R.
Schumann, Louis H.
Simpson, Leonard E.

CLEVELAND, No. 3

Ivanoff, Jordan
Plageman, William H.

COLUMBUS, No. 36

Brown, H. Walter
Monson, Carlton H.
Peelle, Sarah N.

***(DALLAS)* NORTH TEXAS, No. 51**

Angeles, Juan S.
Bermi, Sam A.
Clayton, Frank M., Jr.
Johnston, Robert L.
Larsen, Robert E.
Norris, Ewell R.
Penn, Horace, Jr.
Polites, Nicholas G.
Trees, James C.
Verstraete, Albert H.
Ziemke, Charles G.

DAYTON, No. 18

Davis, Dewitt, Sr.
Krick, Albert H.
Mattix, Paul H.
Newton, William
Oakley, Elmore
Scherer, Ernest F.
Warren, Stanford R.

DECATUR, No. 58

Sellers, William W.

DETROIT, No. 1

Barnes, James E.
Barth, Jay E.
Barth, Lloyd C.
Beckner, Bernard Elmer
Blackinton, Joe Robert
Cameron, William E.
Crady, Allen Edward, Jr.
Cross, Edwin L.
Fox, Edwin F.
Freeman, Samuel R.
Hicks, James H.
Hixson, William F.
Howell, Jerome
Kono, Russell Y.
Linse, Oscar A.
Maxwell, Charles J.
Moss, Walter D.
Murphy, Arthur J.
Muszynski, Joseph P.
Nancarrow, Jack A.
Nolan, Harold W.
Olsen, Edward F.
Pantoja, Vincent M.
Penn, Harold W.
Potter, Lelon D.
Rhodes, Walter C.
Rodgard, Harold T.
Sefcik, Robert
Slusher, Charles T.
Weiss, Walton

ELMIRA, No. 24

Mears, Sherman R.

FOND DU LAC, No. 45

Nichols, Milton H.

FORT WAYNE, No. 56

Borthwick, Ronald L.
Morrison, Wilbur C.

***(GRAND RAPIDS)* WESTERN MICHIGAN, No. 38**

Blackmer, James A.
Klawiter, Lester
McIntyre, William F.

GREATER NEW YORK, No. 34

Cwierz, Mathew J.
Kemler, Michael Paul
Light, Richard H.
Mazziotta, Nicholas J.
Meier, Charles K.
Meima, Robert
Schwarz, Norman H.
Templeton, Donald J.
Tobias, Fred J.
Weiss, Milton

HAMILTON *(ONTARIO)* No. 42

Elliott, John M.
Mills, William I.
Pollock, Robert H.

HARTFORD, No. 7

Didsbury, Russell A.
Kane, James E.
Kirk, William P., Jr.
Ramus, William J.
Reed, Robert S.
Sulich, Louis F.

HOUSTON, No. 29

Blake, Larkin L., Jr.
Bugge, Harold A.
Crawford, Amos B.
Dykes, William E.
Lewis, Charles F.
Liljestrand, Stanley E.
Wheeler, L. H.

INDIANAPOLIS, No. 37

Gough, Melvin O.
Murphy, Francis J.

KANSAS CITY, No. 57

Meyer, Floyd J.
Ricketson, Warren H.

LOS ANGELES, No. 27

Bennett, G. Richard
Crisp, Leonard C.
Hertzberg, Samuel E.
Jones, Leo W.
Kahl, Harold R.
Leach, Hal W.
Mandler, Francis J.
Montgomery, John H.
Morgan, Justin T.
Rudolph, Thomas D.
Simon, Carroll B., Jr.
Smigielski, Roman S.
Smith, Wilbur O.
Smoot, Arren F.

LOUISVILLE, No. 54

Bradley, Charles I.

***(MOLINE, ROCK ISLAND, DAVENPORT)* TRI-CITIES, No. 23**

Collin, Harold S.
Johnston, Lee R.

MONTREAL, No. 50

Neary, Walter T.
Rowe, Philip E.
Wells, Robert Fred
Wilkins, Frederick C.

MUNCIE, No. 70

Price, Carlton A.

NASHVILLE, No. 43

McConnell, Alvin R.
Mott, Charles R., Jr.

***(NEWARK)* NORTHERN NEW JERSEY, No. 14**

Adamoff, Oscar J.
Baker, John Wm.
Ball, James S.
DeYoung, Walter John
Donnelly, George H.
Musterer, Fred W.
Rowe, Alvin W.

NEW HAVEN, No. 41

Butler, James T.
Chase, Lloyd W.

NEW ORLEANS, No. 60

Aldrich, John E.
Koenig, Phil
Petrey, Colonel W.
Pitts, Richard R.
Pratt, Harold D.
Rouleau, Gerald R.
Smith, Henry H.
Wood, Oliver B.

PEORIA, No. 31

Garstka, Walter

PHILADELPHIA, No. 15

Altman, Edward H.
Feyling, Fred C.
Gach, Edward A.
Hastings, Richard J.
Klukan, Frank, Jr.
Leone, Anthony J.
Messa, Matthew A.
Tait, Vincent J.
Wetherhold, Walter F. J.

PHOENIX, No. 67

Maxen, Clyde Henry

PITTSBURGH, No. 8

Rhodes, Milton C.
Trout, Neil R.

***(PORT ARTHUR-FORT WILLIAM, ONT., CAN.)* LAKEHEAD, No. 59**

Charlesworth, William V.
Thierman, George P.

PORTLAND *(ORE.)* No. 63

Fox, Wickham W.
Weatherbee, Wayne W.

***(PROVIDENCE)* LITTLE RHODY No. 53**

Acquisto, Charles F.
Dubois, Leonel J.
Werth, William W.

RACINE, No. 2

Sorenson, Richard A.

ROCHESTER, No. 16

Buehler, Karl
Skakuj, Walter T.

ROCKFORD, No. 12

Johnson, A. M.
Mueller, Bernard Wm.
Saunders, George A.

ST. LOUIS, No. 17

Hansen, Christian W.
Johnson, Joseph C.
Meyer, Charles T.
Miller, James G.
Racen, Ferdinand
Shipman, John Lee

SAN DIEGO, No. 44

Adams, Robinson L.
Allen, Frank R.
Bredeson, David L.
Dambruch, Lyle E.
Fertig, Russell L.
Moliere, Winthrop R.
Scofield, Roland E.
Woolsey, Earl B.

***(SAN FRANCISCO)* GOLDEN GATE, No. 28**

Beede, Stephen M., Jr.
Dick, William H.
Ferrier, William W.
Frank, Stanley L.
Giesselmann, Edgar F.
Golman, Sidney J.
Halliday, George W., Jr.
Reimers, George I.

SEATTLE, No. 39

Billows, John W.
Culberson, William J.
Hughes, Fred J.
Lindley, George W.

SPRINGFIELD *(ILL.)* No. 64

Taylor, Ivor C.

SPRINGFIELD *(MASS.)* No. 32

Kiefer, Kenneth E.
Mills, Theodore W.
O'Neil, William J.
Wright, Joseph T.

***(SPRINGFIELD, VT.)* TWIN STATES, No. 40**

Hicks, Samuel T.

SYRACUSE, No. 19

Waters, Timothy Joseph

TOLEDO, No. 9

Anderson, William R.
Jump, Norman
Kilchenman, Robert E.
Rhoades, John H.
Rodgers, John H.
Sidenstecker, Herman A.

TORONTO, No. 26

Myer, Alexander
Taylor, A. Ross
Watson, George M.

***(WASHINGTON, D.C.)* POTOMAC, No. 48**

Finn, John L.
Hamontre, Hugh C.
Heilman, William E.
Kelley, David P.
White, Rogers S.

WICHITA, No. 52

Cooper, W. Dale
Earnest, Elbert L.
Ling, Carl A.
Maxwell, Van C.
McFadden, Roy A.
Miller, Lewis L.
Shaw, Russell E.
Ward, James C.
West, Lloyd L.
Wilson, William R.

WILLIAMSPORT, No. 49

Calvert, John W.
Wells, James W.

WINDSOR, No. 55

Resume, Floyd J.
Sloan, Charles R.

WORCESTER, No. 25

Janusis, Victor A.
Mahaffy, Reid A.
Palmer, Hans H.
Spink, Robert M.
Way, David Gilbert

AT LARGE, No. 0

Almkvist, Gustav B.
Bausman, Wells F.
Blankmann, George H.
Brandt, H. F.
Brubaker, Franklin P.
Dahlhaus, Frank J., Jr.
Goodwin, John R.
Gubar, George
Jahraus, Alfred B.
Kurtz, Robert Andrew
Larby, James T.
Miksch, Robert H.
Shetlin, Emil
Stalker, Robert D.
Wayne, Edward H.

COMING MEETINGS

DAYTON—September 10, 6:45 P.M., at the Engineer's Club, Dayton. Speaker: Mr. Herman Poock, Inland Div., General Motors Corp. Subject: "The Design of Moulding Dies."

ELMIRA—September 10, 7:00 P.M., at Mark Twain Hotel, Elmira.

ERIE—September 11, Ladies Night. Time and Place to be announced.

FOX RIVER VALLEY—August 14, Leland Hotel, Aurora, Ill. First business meeting.

Officers, committee chairmen and speakers at June 27 meeting of Cedar Rapids Chapter. (Left to right): James Sealy, Second Vice Chairman; V. E. Dew, Entertainment Chairman; Michael Fitzgerald, First Vice Chairman; C. J. Rayman, Membership Chairman; John Speck, Chairman; W. Z. Fidler, Past Chairman, Tri-Cities Chapter; G. M. Schuller, Standards Chairman; E. H. Reinschmidt, Editorial Chairman; Prof. T. G. Caywood, Education Chairman; L. L. Hyler, Public Relations Chairman; A. L. Geiger, Chairman of Tri-Cities Chapter and technical speaker; J. L. Stark, Secretary; and R. A. Hruska, Treasurer.

Analyze Tool & Die Steels

Bridgeport, Conn.—Approximately 125 members and guests of Fairfield County Chapter attended the session devoted to "The Selection and Heat Treatment of Tool and Die Steels."

Messrs. Leonard C. Grimshaw, Chief Metallurgist, and Ray P. Kells, Chief Service Engineer, Latrobe Electric Steel Company, Latrobe, Pennsylvania, conducted the discussion.

Selecting a dozen or so different tools and dies, most of which he illustrated with slides, Mr. Grimshaw prescribed the exact heat treatment for each, also analyzing die steels and their applications.

Mr. Kells handled the ensuing question period, answering queries from the audience for more than an hour.

The group also enjoyed seeing a sound film showing the Sikorsky fighter plane.

Hex Day No Jinx For Golf Tourney

Cleveland, Ohio—The second and last Friday, the 13th, to occur in 1945 was observed by Cleveland Chapter last month with a Jinx Golf Party at Sleepy Hollow Country Club in Brecksville.

J. R. Fitzsimmons

Hoodoos notwithstanding, many found it an extremely lucky day when the numerous prizes were awarded—prizes for high and low scores, blind bogey prizes and door prizes.

Card playing completed the evening, at the conclusion of the dinner program. The highly enjoyable event was staged under the direction of Entertainment Chairman J. R. Fitzsimmons.

Johnson To Represent Pipe Machinery

Cleveland, Ohio—Appointment of Homer B. (Tex) Johnson of Chicago, as their exclusive representative in the Chicago-Milwaukee area, has been made by Pipe Machinery Company, manufacturers of gages, multiple ground thread milling cutters and special tools.

H. B. Johnson

"Tex," a member of Chicago Chapter, ASTE, has had twenty-five years' experience in the gage business, with various tool companies.

A native of Duffau, Texas, he received his training in mechanical engineering at the University of Texas.

Generating Irregular Shapes

Springfield, Vt.—Technical speaker at a recent dinner meeting of Twin States Chapter, held in the Community Club, was Douglas T. Hamilton, Publicity Manager of Fellows Gear Shaper Co.

Discussing "The Art of Generating With a Reciprocating Tool," Mr. Hamilton described various methods of generating on a gear shaper irregular shapes other than gears. Approximately 60 members heard the lecture which was illustrated with slides.

Cedar Rapids Chapter has large attendance of enthusiastic members and guests at its second meeting held June 27 at Roosevelt Hotel.

Dies For Aluminum And Steel Parts

Cedar Rapids, Iowa—An enthusiastic group of 55 members of the recently-chartered Cedar Rapids Chapter turned out June 27 for the second dinner meeting and technical session, held at the Roosevelt Hotel.

Principal speaker of the evening was A. L. Geiger, Chief Engineer, Voss Bros. Manufacturing Company, Davenport, and Chairman of Tri-Cities Chapter, ASTE.

Mr. Geiger spoke informatively on the problems incident to the construction of temporary dies for the forming of aluminum and steel parts. He also stressed the Tool Engineer's and the Product Designer's responsibility to the workmen in the shop, pointing out that explicit instructions should be included in drawings of parts to reduce the probability of scrap.

W. Z. Fidler, Past Chairman of Tri-Cities Chapter entertained with pocket tricks and puzzle problems.

Appointed by Chairman John Speck to committee chairmanships were: Constitution and By-Laws, James L. Sealy, Asst. Supt., Cedar Rapids Eng. Co.; Editorial, E. H. Reinschmidt, Supt. of Design; Program, Michael J. Fitzgerald, Chief Tool Engineer; Entertainment, Bruce Dew, Tool and Die Supt., Collins Radio Co.; Membership, Charles J. Rayman, Mach. Design and Development; Standards, George M. Schuller, Specification Engineer, Cherry-Burrell Corp.; Public Relations, Loiell L. Hyler, Chief Engineer, LaPlant-Choate Mfg. Co.; Education, Thomas G. Caywood, Associate Prof. of Mechanical Engineering, University of Iowa, Iowa City.

Negative Angle Milling Developments

Portland, Ore. — Frank Riffle, Regional Manager, Kearney & Trecker Corporation, Milwaukee, Wisconsin, was guest speaker at Portland Chapter's June 14 dinner meeting in Imperial Hotel.

During his discussion of "Recent Developments in Milling Alloy Steels With Carbide Cutters Having Negative Angles," Mr. Riffle showed Kodachrome films and slides illustrating his subject.

Keen interest in the speaker's presentation was evidenced by the number of questions asked from the floor at the conclusion of his address.

Bomb Plant Mechanized for Production

Chicago, Ill.—More than 100 members of Chicago Chapter visited the Clearing District plant of Mechanical Handling Systems, Inc., June 25, for a tour through the highly-mechanized production line on which 500-lb., general-purpose demolition bomb bodies are being manufactured for the U.S. Army. The trip also included a visit to the production lines on which anchor chain is being manufactured for the U.S. Navy by novel methods. Howard Ammerman, General Superintendent of Mechanical Handling Systems' Metal Ammunition Division, was host for this plant visit. He and his staff had the tours well organized so that every visitor had an opportunity to learn as much as he desired about the various methods employed.

W. V. Casgrain *L. J. Bishop*

Upon completion of the plant tours, the meeting adjourned to the Clearing Industrial Club for a smorgasbord dinner and a technical session at which W. V. Casgrain, President and General Manager, and L. J. Bishop, Vice President and Chief Engineer of Mechanical Handling Systems, Inc., Detroit, discussed the problems involved in setting up mechanized production lines, illustrating with slides some of the completely mechanized lines that they have installed in American manufacturing plants.

In their presentations, Messrs. Casgrain and Bishop stressed the fact that tool and production engineers must help plan new production lines, so that all of the elements will dovetail, with no major changes required to take care of unforeseen difficulties. Tool Engineers, already faced with reconversion problems, found this meeting of especially timely interest.

Chairman Frank A. Armstrong and First Vice-Chairman Clare Bryan made arrangements for the meeting and presided at the technical session. Mr. Armstrong reported on the Area Meeting of Chapter officers held in Chicago on June 24 to discuss the new ASTE Constitution and By-Laws, urging all members to vote promptly.

Neighboring Chapters Hold Joint Outing

Hamilton, Ont.—Approximately 300 members and friends of Hamilton and Niagara District Chapters took part in the Fourth Annual Field Day, held June 16 at Dundas Golf Club, Dundas.

All arrangements for the successful affair were under the direction of W. R. Smith, Hamilton Chapter Entertainment Chairman, with the assistance of his committee and the one from Niagara District.

After the buffet support, a Victory Bond and approximately 130 attendance prizes were awarded.

1. A Rochester Chapter member takes a swing at a tennis ball hoisted on a 12" rubber hose tee in driving contest at June 23 picnic, Irondequoit Bay.

2. Three Rochester officers relax in a quiet nook. Left to right are Clifford Sears and Chauncey G. Newton, Past Chairmen, and Earl DeBisschop, Chairman.

3. Rochester Chairman DeBisschop tries his skill at nail driving, while Russell Howard, at his left, judges and Public Relations Chairman Robert T. Barnett, kneeling at right, reports event.

Steel Most Versatile Casting Metal

Springfield, Ill.—B. J. Aamodt, Manager, Steel Sales, National Malleable and Steel Castings Company, Cleveland, Ohio, was technical speaker at the July 10th meeting of Springfield Chapter.

In discussing the casting of steel, Mr. Aamodt emphasized the wide range of mechanical properties obtainable in this metal, through varying the alloy content, or the heat treatment of the castings or both. The speaker also displayed a comprehensive selection of steel castings.

Films, showing design and manufacturing of steel castings, were presented by the Steel Founders Society of America.

Water and Land Sports Divert Picnickers

Rochester, N.Y. — Taking advantage of one of the first sunny days of the season, approximately 225 members of Rochester Chapter and their guests enjoyed the group's seventh annual picnic held June 23 at Point Pleasant Hotel, on beautiful Irondequoit Bay.

Sailing and speed boating on the bay occupied many, while others participated in the program of sports directed by Russell Howard and his committee. There was friendly rivalry in nail driving, golf ball driving and other games. Numerous attractive prizes were distributed among the pinickers.

Howard Ammerman, General Superintendent, Mechanical Handling Systems, Inc., and host for Chicago Chapter's June 25 visit to his company's plant, shows 500-lb. demolition bomb body and heavy anchor chain to Frank A. Armstrong, Chicago Chapter Chairman, while other Chicago members look on with interest.

Horner Urges Blueprint for Preparedness

Hartford, Conn.—" 'For the first time in the history of war, battles were as much tussles between competing factories as between contending armies. The production of weapons more so than the conscription of men was the deciding factor in battle. God marches with the biggest industries rather than with the biggest battalions. . . .' "

H. M. Horner

With these arresting words, H. M. Horner, President, United Aircraft Corporation, opened his address, "Aviation and National Defense," given before members of Hartford Chapter at their Annual Hartford Night. Mr. Horner pointed out that these words were not his, but were quoted from Major General J. F. C. Fuller, noted British military authority.

Mr. Horner continued, "With that quote as a premise . . . I'm going to indulge in a little reminiscing on what has happened in the aircraft industry during the past several years. For purposes of simplification I am going to use engine production figures . . . further, I'm going to reduce all engine production to a uniform size.

Engine Output Mounts

"In the early 1930's the output of aircraft engines on this uniform rating basis ran pretty evenly at around 2000 per year. By 1938 production had increased to roughly 4000 per year. But in 1944 this country produced better than 450,000 of these engines—an increase from 4000 to 450,000 per year in six years!

"In this war expansion our country was most fortunate in getting what amounted to a three-year head start from French and British orders of major size which were received early in 1939, while the Pearl Harbor attack did not take place until December, 1941. In the early stages of this expansion in aircraft production, we had the great advantage of practically no competition in the procurement of tooling and materials, which materially aided us in getting underway fast. The problems of tool design and manufacturing capacity when the impact of all-out war production hit this country, are, I know, fresh in all your minds.

Need Postwar Protection

"Now, I am not unmindful of the fact that we still are fighting a bitter war of survival with the Japanese. But I do not believe that by giving post-war national defense consideration now, while the problems of equipping a modern army are fresh in our minds, that we are in any way diminishing our ability to beat the Japs.

"Somehow, someone is going to have to decide what this country should do to insure our protection from a possible future aggressor. This problem is far different in our 60-hour air age world than it was in the just past 80-day world of Jules Verne, and I think we can be sure that in the future any aggressor nation will hit us first, for in two world conflicts history has proven that, given time to get under way, the United States can turn the scales to victory.

"There are, of course, a lot of other angles to this problem than just that of production. There is the obvious necessity of a continuing program for keeping us ahead technically so that at any given time we will have the designs perfected and proven to produce in quantity. But I want to confine myself to the production phase.

Miraculous Performance

"Now a miracle was accomplished in production for this war, but it still took time to get underway. Implements of war won't be simpler in any next war, and it is again going to take time to get underway. And no one knows better than the Tool Engineers what this time period will be. I firmly believe it is the patriotic duty of all of us to give these facts to those who will be planning for our future national defense; to give them the facts for all industry on whose side in any war, as General Fuller said, 'God now marches.'. . .

"An ordinary peace-time 1½ shift 40-hour week production rate can be doubled in roughly 6 months. This is primarily a manpower training job. This production rate can again be doubled in roughly 6 months provided we have first call on tools and materials. This all adds up to quadrupling the rate of production of a going facility in a year. No converted facility such as the automotive industry can help in this period for it will take, as it took in this war, roughly a year and a half for them to convert and to get producing. This increasing production rate might average out for the full 12 months period at some two to two and a half times the going rate on attack day. By working back from the production required in the first year after attack, a required rate of preparedness production can be arrived at.

50,000 Required

"For instance, let's assume a required rate of 50,000 of these basic engines in this 12 months period (which is a ninth of those produced in the past year). . . . To meet this requirement the engine industry would have to be producing at the rate of roughly 20,000 engines per year just prior to attack day. That 20,000 engines compares to the 4,000 actually produced in 1938 and even then makes possible an output in the first year of only 11 per cent of the delivery rate of 1944.

"This is a simple formula. It may not be the best one, but it is one which could be used for determining the size of the aircraft industry we should have in peacetime in order to adequately provide for the national defense if another war comes. And it does give an indication of the importance of the time element in any formula.

"You may be wondering where you Tool Engineers come into this picture. Well, I think that you have one of the keys to the problem in your hands.

Pass On The "Know-How"

"This is it. You still have fresh in your minds the terrific handicaps you individually faced in getting tooling underway to meet the needs of war production. You know the job took time and will take time in case of another war. You can and must make sure that those who will formulate the future defense and preparedness program understand the facts you know so well from experience.

"You've got to tell them those facts and keep them from being lulled into a false sense of security because of the head start we had in this war."

Peiffer Accepts New Post

Cleveland, Ohio—Harold E. Peiffer has joined The Cleveland Duplex Machinery Company, Inc., where he has charge of the company's Northeastern Ohio territory.

Harold E. Peiffer

Formerly Chief Methods Engineer at Barth Stamping Company, Mr. Peiffer's industrial experience has been varied and comprehensive. At the beginning of the war, he went to Savage Arms Corporation, Utica, New York, as Chief Estimating Engineer, having previously been employed in engineering capacities at National Tool Company, Standard Tool Company, and Cleveland Scale Works, Cleveland; The Peiffer Electric Company, American District Telegraph Company, and North East Electric Company, Rochester, New York.

Born in Rochester, he studied engineering in that city and in Cleveland. At the age of ten, he entered the tool business, working after school hours as an apprentice in his father's tool shop.

Prominent in Cleveland engineering circles, Mr. Peiffer is a member of the Publicity Committee of the Board of Governors, Cleveland Technical Societies Council, editing the "News of the Tool Engineers" column of the Council's publication, *Cleveland Engineering*; a member of the Applied Mechanics, Production Engineering and Management Committees of ASME; Treasurer and Public Relations Chairman of Cleveland Chapter, ASTE; and author of technical articles on special tooling.

Jet Fighter Adaptable To Future Transportation

Los Angeles, Calif.—Credited by Lockheed Aircraft Corporation with the successful design and development of the prototype of the P-80 Shooting Star Jet Fighter, C. L. (Kelly) Johnson, Chief Research Engineer of that company, addressed 255 members and guests of Los Angeles Chapter at the June 14 dinner meeting held in Scully's Cafe, explaining "Jet and Rocket Propulsion."

C. L. Johnson

Earlier responsible for such famous ships as the P-38 Lightning and the giant Constellation Transport, his latest achievement, completed in the remarkable time of 143 days, marks Mr. Johnson as one of the leading aeronautical designers in this country.

According to Army officials, the P-80, fastest and highest flying airplane in the world, has given the U.S. Air Force an inestimable, qualitative advantage over our enemies. Equally important, the success of this first jet-propelled fighter plane to be accepted by the Army, for combat, heralds a new era in postwar transportation.

Released for its first public showing, a film was screened, illustrating the construction and performance of this outstanding plane.

Quarried at the Fox and Hounds Club, Boston, are (left to right): J. B. Savits, First Vice Chairman, Boston Chapter; President C. V. Briner of Cleveland, Past President Ray H. Morris of Hartford; Regional Director W. W. Young, Chairman Arthur A. Nichols, Secretary F. H. Leonard and Second Vice Chairman J. X. Ryneska, all of Boston Chapter.

The local ASTE'ers played host to Messrs. Briner and Morris who were en route from the OPC July 7-9 weekend conference at "Clovelly," New Hampshire summer home of Vice President A. M. Sargent of Detroit.

Conducts Experiments At Electronics Session

Detroit, Mich.—Walter C. Smith, Engineer of Foreign Wire Relations, Michigan Bell Telephone Company, outlined "The History of Electronics" before a recent meeting of the Junior Section of Detroit Chapter.

Walter C. Smith

Beginning with the electrical experiments conducted by Benjamin Franklin, pointing out the important contributions of various research workers and scientists, up through the work of Millikan, Wilson and Eddington, Mr. Smith emphasized the importance of a knowledge of the background of the science, for an adequate appreciation of its present status.

As the speaker developed his subject, he made demonstrations of some of the outstanding experiments described in his address.

Complementing this program, the Westinghouse technicolor, sound film, "Electronic Light," was shown. The film portrays the development and manufacture of fluorescent lights.

Carpenter Joins Plan-O-Mill

Detroit, Mich.—Plan-O-Mill Corporation has announced the association of T. B. Carpenter with their sales agency, the R. M. Wright Company.

T. B. Carpenter

Mr. Carpenter will handle the company's thread and form milling machines, milling cutters and special form relieved cutters throughout the State of Michigan. A newly-designed thread miller, now in the experimental stage, will soon be available.

Formerly connected with The Wickman Corporation as Vice President, his earlier industrial experience includes engineering positions with National Automatic Tool Company, Richmond, Ind., whom he represented in Paris, France; G. M. Truck Corp., Pontiac; Rock Island Mfg. Co., Rock Island, Ill.; Yellow Sleeve Valve Engine Works, East Moline, Ill.; Stewart-Warner Corporation, and E. Edelmann Co., Chicago.

A charter member of the Society and President of ASTE in 1934-35, Mr. Carpenter has also served as Director and as a member of various committees.

Arizona Group Plans Educational Program

Phoenix, Ariz.—Fifty-two members of the newly-formed Phoenix Chapter met June 28 at Westward Ho Hotel to discuss the revised Constitution, then pending vote by the membership. William Morgan, speaking for the Constitution and By-Laws Committee, presented an excellent summary of the contemplated changes.

Education Chairman Earl English outlined the proposed program of his Committee and its opportunities for service in the State of Arizona. Educators, representing the city and state, have been secured to speak on the progress of vocational education during the war years.

Two navy films were viewed by the group.

* * *

At the previous meeting, a large group enjoyed an extensive trip through the Litchfield Park Plant of the Goodyear Aircraft Corporation. Chapter members employed at the plant conducted the party through the B-24 Navy Modification Center.

* * *

Officers installed when Immediate Past President D. D. Burnside chartered Phoenix Chapter include: Chairman Charles W. Clarke, Chief Production Engineer; Secretary Jack R. Robinson, Production Engineer, AiResearch Mfg. Co.; 1st Vice Chairman Harry E. Rives, Asst. Mgr. of Tool Div., Goodyear Aircraft Corp.; 2nd Vice Chairman Arthur Hering, Tool and Diemaker Foreman, Aluminum Co. of America; and Treasurer Jesse E. Hawley, Owner, Hawley Tool & Die Co.

Chairman Clarke has appointed as committee chairmen: Constitution and By-Laws, Anthony LaSalvia, Tool Designer; Standards, Ernest Cheyne, Mfg. Tool Div.; Program, Harry E. Rives, Asst. Mgr. of Tool Div., Goodyear Aircraft Corp.; Editorial, Floyd Hughes, Design-Tool Engr. Drafting; Membership, T. P. Papandrew, Tool Engineer; Industrial Relations, George A. Willett, General Foreman Machine Shop, Aluminum Company of America; Public Relations, Neil McLeod, Asst. General Supt.; Education, Earlon G. English, Production Eng., AiResearch Mfg. Co.; Entertainment, Merrill J. Richardson, Engineer, Arizona-Edison Co.

Phoenix Tool Engineers

Members in the Phoenix, Arizona, area gathered at Westward Ho Hotel for the chartering of Chapter 67.

Seated at the table on the left are, from left to right, J. E. Hawley, Treasurer; Harry Rives, First Vice Chairman; Charles Clarke, Chairman; D. D. Burnside, Immediate Past President, who conducted the election of officers and presented the charter, and Arthur Hering, Second Vice Chairman.

Today's Plans Build Tomorrow's Industry

Elmira, N.Y.—"The pattern of the life of tomorrow is what we build today," James Y. Scott, President, Van Norman Company, Springfield, Massachusetts, reminded Elmira Chapter when he was guest speaker at their recent Annual Industrial Leaders' Night.

A vigorous and inspiring speaker, Mr. Scott, who has served as President of the NMTBA, captured the imagination of his audience with his address, "The Machine Tool Industry In The Postwar Era—Its Future and Growth." He emphasized that there is too much apprehension for the future with too little realistic planning in the present.

After reviewing statistics on the machine tool outlook, competition, labor problems and the returning veteran, ASTE'er Scott climaxed his discussion with the subject closest to his heart—a real appreciation of America, the land of opportunity.

"The Aftermath of War Production," a motion picture analysis of the problems of orderly disposal of surplus materials and equipment, was screened at the conclusion of the speaker's address.

One of the highlights of the occasion was the presentation by Chairman George N. Morceau, of an attractive, framed certificate of appreciation to each of the Chapter's Past Chairmen. Those receiving the awards were J. Raymond Blank, M. Hugh Evans, Dolph Kylor, John R. Lynch and Conway D. Thomas.

Approximately 300 members and guests attended the dinner meeting at the Mark Twain Hotel. Head table guests included E. A. Mooers, Vice President and General Manager, The Hilliard Corporation; R. C. Robinson, Plant Manager, American Bridge Company; C. T. Burke, Manager, Swift Lubricator Company; V. P. Mathews, Manager, Andover Motors; D. G. Anderson, President and General Manager, Hardinge Bros., Inc.; T. W. Tinkham, General Manager, Eclipse Machine Div., Bendix Aviation Corporation; C. H. Sayre, Manager, Trayer Products Company; E. J. Smith, General Manager, Ingersoll-Rand Company; and Edward Schweizer, General Manager, Schweizer Aircraft Corporation.

Chairman Harold Shafer and a delegation from Williamsport Chapter were also present.

Compares Metals Used In Die Castings

Fond du Lac, Wis.—An address on "Die Castings" by Arthur W. Peck of the Milwaukee Die Casting Company highlighted Fond du Lac Chapter's July meeting held on the 13th at Grand Hotel in Sheboygan.

Mr. Peck discussed the possibilities of zinc, aluminum and other metals for die casting, pointing out the limitations of these materials in various applications. While zinc is subject to internal corrosion from chemicals found in water, when used in plumbing fixtures, it gives good service in washing machines, through the action of soap used in laundering, the speaker stated by way of example. A large display of samples was exhibited to illustrate the applications recommended.

Lieutenant Colonel Ralph Kraut, a member of the Chapter, spoke briefly about his experiences in the Pacific theater of war, commenting that the material supplied to our forces far exceeds that used by the enemy.

During the evening a farewell was tendered to Luis Garay, Chief Petty Officer of the Peruvian Navy who has been in Fond du Lac for the past year.

New Assistant Manager For Canadian Firm

St. Thomas, Ont.—Louis DeLauche has accepted the position of Assistant Manager with the British American Foundry & Machine, Ltd.

Louis DeLauche

A manufacturer of automotive accessories, the firm is expanding to produce light metal components not previously fabricated in Canada.

Formerly associated with A. C. Wickman Company at Toronto, Mr. DeLauche has also held engineering posts at St. Catharines Steel Products, Dominion Ammunition Company and McKinnon Industries, St. Catharines; and at Continental Motors, Muskegon, Michigan.

He is affiliated with Toronto Chapter, ASTE, having transferred from Hamilton Chapter.

Twin City Group Enjoys Dinner Dance

Minneapolis, Minn.—Twin City Chapter closed its season's activities June 16 with a dinner dance at the beautiful Columbia Chalet.

Following the dinner, Chairman Wallace Ahlberg called upon Past Chairman George Wise, "the grandfather of Twin City Chapter," to review the history and highlights of the organization. His comments on the Tool Engineer's importance to the war effort met with enthusiasm.

Dancing and entertainment provided a full and enjoyable evening for the 150 members and guests present.

Elmira Chapter Industrial Leaders' Night

1. Chairman George N. Morceau presents Certificates of Appreciation to Past Chairmen of Elmira Chapter. Left to right, M. Hugh Evans, 4th Chairman; Mr. Morceau, Present Chairman; Dolph Kylor, 5th Chairman; and J. Raymond Blank, 2nd Chairman. Unable to be present were John R. Lynch, 1st Chairman; and C. D. Thomas, 3rd Chairman.

Officers and invited guests at head table: 2. Left to right, C. H. Sayre, Manager, Trayer Products Company; E. J. Smith, General Manager, Ingersoll-Rand Company; Edward Schweizer, Manager, Schweizer Aircraft Corporation; Edward Stachel, 2nd Vice Chairman, Elmira Chapter.

3. F. B. Allen, Chapter Secretary; E. A. Mooers, Vice President and General Manager, The Hilliard Corporation; R. C. Robinson, Plant Manager, American Bridge Company; C. T. Burke, Manager, Swift Lubricator Company; V. P. Mathews, Manager, Andovers Motors Corporation; Burr W. Jones, 1st Vice Chairman, Elmira Chapter.

4. D. G. Anderson, President and Manager, Hardinge Bros., Inc.; Guest Speaker—James Y. Scott, President, The Van Norman Company, Springfield, Mass.; Chairman Morceau, and T. W. Tinkham, General Manager, Eclipse Machine Div., Bendix Aviation Corporation.

Rebuilds Jap Miller In Marianas

Marianas Islands—Making full use of his skill as an experienced machine repairman and tool designer, John J. Gustaitis, 27, Machinist's Mate, Second Class, USNR, of Detroit Chapter, ASTE, repaired and rebuilt a Jap milling machine and two lathes which are now in use in the machine shop of a Navy Seabee battalion here.

This Japanese milling machine was a major prize for the Navy Seabees when they landed on Saipan. Wrecked by the Japs, the machine was repaired and rebuilt by MM 2/c John J. Gustaitis of Detroit Chapter, ASTE, who is shown at work on the miller.

One of the machines is a "Simamoto" 15-inch lathe. Another is a "Seiki" turret lathe. The milling machine included many American-made parts, notably bearings with the well-known SKF trademark. The machines are smaller than similar American ones Mr. Gustaitis said, and while sturdy, "the workmanship does not compare with ours."

"The basic job," the Seabee continued, "was replacing the pinion gear and rack which were missing from the Simamoto Lathe. Since these parts had to be machined to fit Japanese teeth measurements, we had a lot of trouble. The bed was badly shot up, and the tail stock was also hit and had to be welded. It took three weeks to scrape in the bed of this lathe and about three days to overhaul the headstock assembly. The other machines were shot up and required about the same amount of work."

The Marianas climate is hard on machinery. "Our biggest battle here," remarked the Navy Seabee tool designer, "is with rust. Things rust overnight in this climate."

A graduate of Southwestern High School, of Detroit, ASTE'er Gustaitis attended evening classes at Wayne University after he began working. He was employed by General Motors as a machine repairman until two years before he entered the service. During his last two years as a civilian, he was a tool designer for Hudson Motor Car Company.

After reporting for active duty with the Navy Seabees on May 13, 1943, he was trained in Virginia, Rhode Island, and Mississippi. His unit also had duty in California before shipping out for its first overseas service at Pearl Harbor.

Machine Tools Controlled By Electronics

Dayton, Ohio—"Electronics As Applied To Machine Tools" was the technical topic presented by B. T. Anderson, Electrical Engineer, Sundstrand Machine Tool Company, Rockford, Illinois, at the June 11 meeting of Dayton Chapter.

B. T. Anderson

Using motion pictures and slides, Mr. Anderson explained the basic conceptions of electronic control, the steps in developing controls, and milling machines operated with full electronic cycle control of speed, feed and location.

Fifty-five members attended the dinner meeting at the Dayton Engineers Club, invited guests from other technical societies joining them for the technical session held in the Club Auditorium.

Offers Scholarship at MIT

Boston, Mass. — Heading the list of scholarship prizes, published in Massachusetts Institute of Technology's Catalog for next fall, is the $100 gift from Boston Chapter to be offered annually for five years for the best thesis on the subject of Tool Engineering.

William D. Rodrick

The award was originally proposed by William D. Rodrick of General Electric Company, Lynn, former Boston Chapter Education Chairman. Pointing out that ASTE can be successful only in proportion to its efforts to make its members more valuable to industry and society, Mr. Rodrick indicated that a thesis on some subject related to Tool Engineering would serve to interest schools in the opportunities afforded graduates in this field. At the same time industry would recognize the project as a scientific approach to the problem of education.

Appointment of Arthur A. Nichols and Captain Irving H. Comroe as a Scholarship Committee resulted in conferences with many of the leading schools in the area. After much study a plan worked out by H. E. Lobdell, Dean of Students at MIT, was recommended and adopted. The recommendation reads as follows:

"The Committee recommends the establishment at Massachusetts Institute of Technology of a monetary prize of $100 offered annually for the best graduation thesis on a subject related to the professional field of Tool Engineering, on a five-year initial basis."

Commenting on the endowment, Dean Lobdell said, "It is our belief that the establishment of such a prize, under the conditions outlined, would operate to stimulate an interest on the part of senior or graduate students in the professional field of Tool Engineering."

Abstracts of the prize-winning theses may be considered for publication in *The Tool Engineer.*

Tri Cities Chapter gathers around the smorgasbord table, for their Annual Stag Party held June 9 at the Olive Singers Home on Rock River near Moline, Illinois.

ASTE'ers Assist Ordnance In Tool Disposal

Cincinnati, Ohio—Typical of Tool Engineers' many voluntary contributions to the prosecution of the war are those of a little group of Cincinnati ASTE'ers members of the Cutting Tool Panel, a sub-committee of the Machine Tool Panel, Cincinnati Army Ordnance District.

Arthur C. Pletz, Chairman of the Committee, and owner, A. C. Pletz Co., and his associates, J. B. Elfring, Chief Tool Engineer, Cincinnati Milling Machine Co., W. J. Frederick, President, Frederick Steel Co., and M. L. Albrecht, Vice President, The F. W. Brehmer Machine & Tool Co., although busy with their own tasks, find time to travel about the district at their own expense, visiting plants in Dayton and Springfield, Ohio; Indianapolis and Plymouth, Indiana; Chattanooga and Knoxville, Tennessee; Louisville and Maysville, Kentucky, as well as in their own city.

Earlier in the armament program they co-operated with the Ordnance Personnel, their contractors and sub-contractors, advising them concerning proper tooling and sources of supply necessary to execute the mass production orders.

In 1943, Mr. Pletz, and 49 other ASTE members of Machine Tool Panels in various Ordnance Districts, were cited by the Ordnance Department "For distinctive service to their country . . . by making a marked contribution through their initiative and ingenuity . . . to vital war production for the conservation of critical materials and machines."

All four of the Cincinnati Chapter members of the Cutting Tool Panel in that District have been active in the Society. Mr. Pletz is a Past Chairman of the Chapter, while Mr. Frederick, now National Treasurer and Chapter Constitution and By-Laws Chairman, was previously Chairman of the National Finance Committee, Regional Director, Chapter Chairman and Treasurer. Mr. Elfring, the present Chapter Industrial Relations Chairman, formerly headed its Nominating Committee. Mr. Albrecht has served as Chapter Industrial Relations Chairman.

A. C. Pletz

J. B. Elfring

W. J. Frederick

M. L. Albrecht

There they inspect, list and appraise new and used tools remaining at the termination of war contracts. Reports are made on the condition and value of the tools, with recommendation for salvage or disposal.

Cartridge cases in process of manufacture at the Norris Stamping and Mfg. Company, Vernon, California, were viewed by Los Angeles Chapter members during recent tour of the plant. About 250 ASTE'ers were conducted in small groups through the factory.

West Coast Studies Postwar Problems

Los Angeles, Calif.—Four speakers appeared on the program scheduled July 12 by Los Angeles Chapter.

Thomas T. Arden, President of Grayson Heat Control, Ltd., Lynwood, discussed the peculiar aspects of postwar planning in this area, a vital subject because plant capacity and population have shown a greater increase in this section than in any comparable territory in the United States.

Technical speakers at Los Angeles Chapter meeting July 12: (Left to right) G. M. Tarbell, Jones & Lamson Machine Company, Springfield, Vermont; C. E. Nickerson, Engineering Department, Lockheed Aircraft Corporation, Burbank, and Preston Dawson, Technical Consultant, Engineers Specialties Division, Universal Engraving and Colorplate Company, Inc.

Revised standards in Acme screw threads for aircraft were explained by C. E. Nickerson of the Engineering Department, Lockheed Aircraft Corporation, Burbank, who listed the reasons for the newly-established tolerances.

G. M. Tarbell of Jones & Lamson Machine Company, Springfield, Vermont, described the uses and applications of the optical comparator, while Preston Dawson, Technical Consultant for the Engineers Specialties Division of the Universal Engraving and Colorplate Company, Inc., outlined the application of charts to inspection by optical comparators.

The showing of a sound film, "The Building of San Francisco Bay Bridge," concluded the dinner meeting attended by 108 members and guests.

* * *

Two groups of members, totalling approximately 250, visited the plant of the Norris Stamping & Mfg. Company, Vernon, California, June 27 and 28.

Restricted to Society members because of security regulations and the numbers involved, the parties were conducted through the well-laid-out and expertly-managed plant in small groups. Competent guides explained the details of the work being performed on 3" 50-caliber, anti-aircraft steel stampings, 6" brass cartridge cases, 81 mm. mortar shell stampings and 5" 38-caliber ammunition containers.

New Developments in Use of Carborundum

Erie, Pa.—"Higher Production and Greater Precision of Carborundum" was discussed by Francis D. Bowman, Director of Public Relations, The Carborundum Company, Niagara Falls, N.Y., speaking before a recent meeting of Erie Chapter.

After outlining the discovery of carborundum, the manufacture and use of carborundum products, Mr. Bowman showed motion pictures illustrating grinding applications.

Converts Odds and Ends Into Electric Snow Shovel

Adventures of Tooling Wizard Recalled

Buffalo, New York—Remembering the mountains of snow which fell in the Buffalo area last winter, paralyzing even rail transportation, Arthur A. Schwartz, Chief Tool Research Engineer, Bell Aircraft Corporation and a member of Buffalo-Niagara Frontier Chapter, ASTE, has perfected a device to take the backache out of snow shoveling.

Easy Operation

Utilizing the principle of the rotary snow plow, he has designed a machine which makes snow removal no more strenuous than running a vacuum cleaner. Materials used in the original model, built by William W. Williams, an associate at Bell Aircraft and partner in this private project, consisted of a one-third horsepower electric motor, a kitchen frying pan, a garbage pail, a length of stove pipe and elbows, two pulley wheels from a lathe bench, some scrap metal and a few assorted bolts and nuts. Total cost of the contrivance was $12.00.

The garbage pail was shaped to form a scoop to direct the snow into a spinning disc, covered by a housing made from the frying pan. Disc blades were made by cutting and forming the scrap metal into a type of fan which throws the snow backward where it is caught by impellers—metal strips bolted to the rear of the disc—and shot out through the stove pipe.

Convinced of Practicability

From the workout given this rough model late in the season, both the inventor and the builder are convinced that the machine is practical. Six experimental models, incorporating a number of refinements in the original specifications, are being built of aluminum castings. It was found that a one-quarter-horse-power motor would deliver more than enough power to drive the fan and the impelling blades and still eject the snow a distance of ten to fifteen feet from the stack. Weight of the finished power shovel will probably not exceed twenty-five pounds.

An attachment will also be available to convert the "snow shovel" into a lawn mower. The grass cutter is so designed that a comb picks up the grass which is then cut by a saw-like circular blade. The clippings can be directed into a bag for disposal or shot back onto the cut portion of the lawn.

According to Mr. Schwartz, the next step in the development of the Power Snow Shovel will be a gasoline-driven model for use where electrical connections are not available.

Receives Widespread Publicity

The invention of the novel and much-needed appliance has brought wide publicity in the press, trade papers and magazines to ASTE'er Schwartz, already well-known for earlier inventions and production machine designs, as well as for his published technical articles, one of which appears in this issue of *The Tool Engineer.*

His pioneer spirit undoubtedly springs from his early prairie life in the then Territory of Dakota, spent in a sod house—half cellar and half walls, with a slough grass thatched roof. Mr. Schwartz recalls that Buffalo hunts passed the front door of this house and that settlers and squatters from a forty-mile radius gathered but ten miles away to defend themselves from the rampages of the Sioux Indians.

Sweeping through two states in one day, the great prairie fire of 1889 destroyed grain, livestock and homes—terminating the sod house period.

Mr. Schwartz' mechanical inclinations were fosterd in childhood when he passed many hours at the blacksmith shop, serving as the motive power for blower and drill press.

During the five-month isolation imposed by deep snows and raging blizzards, the family amused themselves with games, self-created diversions, and the teaching of young Arthur—particularly a pedagogic brother who insisted on at least twelve hours of study every day except Sunday.

Educated At Home

This intensive education bore fruit when oportunity to attend public school finally presented itself, the home-tutored lad passing eighth grade examinations after four two and one-half month terms of formal instruction.

Seized with wanderlust, the precocious youth set out to see the world, acquiring a B.S. at the University of South Dakota, with the aid of vacation employment by the U.S. Geodetic Survey which included a geological expedition to the Black Hills and a trip to Honolulu.

Adventure beckoned with the Klondike gold rush, young Schwartz working his passage to Alaska where he stayed two and one-half years.

Having attained a wife, dexterity with tools, and experience in stretching dollars, the intrepid Schwartz decided to launch a business enterprise, opening in 1912 one of the first garages in the city of Buffalo, where he also built his Models 2 and 3 of air-cooled, two-cycle cars.

Later activities included a superintendency with the John Johnson Construction Company, in the building of many of Buffalo's grade crossings; ownership of Superior Machine Company and a radio store; a partnership in McNevin, Schwartz and Whiteside Manufacturing Company, producers of electrical wiring components and, during World War I, parts for French armament; as well as two carefree years, touring the continent in a housecar of his own design and construction.

For the past eight years, Mr. Schwartz has been associated with Bell Aircraft Corporation of Buffalo, as inventor, designer and estimator of machines, tools and tooling. Among the many production machines, devised by him and now used in most aircraft factories, are the Farnham leading edge rolls, spar millers, countersinking machines, and two-bladed, malleable iron milling cutters.

At the ASTE Eleventh Annual Meeting, held in Milwaukee in conjunction with the 1943 Machine and Tool Progress Exhibition, Mr. Schwartz read a paper on "Tools and Methods for High Speed Machining," which included the treatment of ferrous as well as non-ferrous materials.

Hobby Is Photography

Skilled in photography, he is affiliated with the Photographic Guild of Buffalo, while his membership in the United Spanish War Veterans indicates some military experience which Mr. Schwartz modestly omits mentioning.

Terming himself "a lucky guy" in having enjoyed a full life, Research Engineer Schwartz says, "the old adventuresome spirit must be subsiding, as I find myself still in the employ of Bell Aircraft after nearly eight years of happy delving among the things I love best—tools and productive machinery."

The first model of a small-scaled snow plow is shown by its maker, William W. Williams, left, to the man responsible for its design, Arthur A. Schwartz. Materials used include a small electric motor, a kitchen frying pan, a garbage pail and a length of stove pipe.

Eaton Now Plant Manager At Crawford Door

Detroit, Mich.—Floyd W. Eaton, for the past two years Factory Superintendent at Crawford Door Company, has been advanced to Plant Manager in charge of the company's two factories.

F. W. Eaton

Joining the Crawford staff in 1942 as Personnel Manager, Mr. Eaton was responsible for recruiting and training the personnel required by the company's rapid expansion in the production of aircraft engine parts at their main plant on St. Jean Avenue. Manufacture of hardware for their upward-acting door is carried on at the Woodbridge Plant.

During the early stages of the war, the ASTE'er was associated with the Training-Within-Industry Division of the WMC, conducting training classes in Detroit and vicinity. Previous to this, he had served for a number of years as Tool Engineer and Supervisor of Apprentices at Burroughs Adding Machine Company.

Now Chairman of the Finance Committee, Mr. Eaton has held many ASTE offices, including terms as National Treasurer, National Secretary, National Director, Chairman of the former Sub-Committee on Training-Within-Industry, as well as Chairman and Secretary of Detroit Chapter.

New Works Manager At Johnson Gage

Bloomfield, Conn.—C. Roy Anderson of Hartford Chapter, ASTE, has been appointed Works manager of Johnson Gage Company, of this city.

C. R. Anderson

Mr. Anderson was formerly Assistant Superintendent of the Gage Department, Pratt & Whitney Division, Niles-Bement-Pond Company, West Hartford.

Golden Gate Group Sees Gun Plant

San Francisco, Calif.—A trip to the Benicia Plant of the Yuba Manufacturing Company, producers of 155 mm. Howitzer guns for Army Ordnance, preceded a recent meeting of Golden Gate Chapter.

Sanford Wixson, Chief Production Engineer at the plant, personally conducted the group through the various departments, giving the visitors a very thorough and enlightening outline of the processes of gun manufacture, including the boring, rifling and precision honing of the barrel and some unusually interesting machine operations used in machining the breech blocks and breech rings.

Mr. Wixson, a Chapter member, gave an interesting summary of the highlights of the tour, during the subsequent dinner meeting at Spanger's Cafe.

Stresses Motion Analysis of Personnel

Peoria, Ill.—Members and guests of Peoria Chapter had the privilege of hearing E. H. Nieman, Superintendent of Carter Carburetor Corporation, St. Louis, and a Past Chairman of the ASTE Chapter in that city. Mr. Nieman spoke on "Tool Designing for Production" at the June 5 dinner meeting in American Legion Hall.

Well-qualified to present his subject, through 25 years' experience with his company, Mr. Nieman used constructively the factor of motion analysis of personnel in his talk. Motion pictures illustrated his address.

Cole Elected Officer At Pope Machinery

Worcester, Mass.—Raymond A. Cole, actively associated with the machine tool industry for many years, has been elected Vice President of the Pope Machinery Corporation, Haverhill, Massachusetts.

R. A. Cole

An authority on precision grinding machinery, Mr. Cole will be available for consultation on the application of Pope sealed lubrication precision spindles, both motorized and belt driven, to all types of machinery. He was previously Experimental Engineer in charge of grinding machine research and development, Grinding Machine Division, Norton Company, Worcester, Mass.

Mr. Cole's extensive experience in industry also includes connections, in various capacities, with Colt's Patent Fire Arms Company, Hartford, Connecticut; Robert T. Pollock Company, Boston; New England Westinghouse Company, Strathmore Paper Company and National Equipment Company, Springfield; and Fisk Rubber Company, Chicopee Falls.

A Past Chairman of Worcester Chapter, ASTE, Mr. Cole was a speaker at the Society's Twelfth Annual Meeting in Philadelphia, reading a paper on "Electronic Control As Applied To Grinding Machines."

Stainless Steel Forgings

Binghamton, N.Y.—Final meeting of the season for Binghamton Chapter was held June 13 at Arlington Hotel, with 40 members and guests in attendance.

Edward Furry, Union Forging Works, Endicott, gave a fine presentation of the "Manufacture of Stainless Steel Forgings," including a large display of samples of forgings in various stages of processing.

Photographs Wanted!

For greater reader interest, send PHOTOGRAPHS along with Chapter News items whenever possible.

OBITUARIES

Earl T. Troendle

Earl T. Troendle, representative for A. V. Wiggins & Company, Syracuse, New York, recently passed away at the age of 55.

Earl T. Troendle

A native of Syracuse, his industrial experience included service with Brown-Lipe Gear Division, Brown-Pipe Chapin Div., GMC, New Process Gear Company, Syracuse Supply Company, and Rollway Bearing Company, as well as several years' association with Spicer Manufacturing Company of Toledo, Ohio, as Superintendent of Manufacturing.

For the past five years Mr. Troendle had been connected with the Wiggins Company as factory representative and tool engineer for Masterform Tool Company and Lake Shore Tool Works of Chicago, Acromatic Tool Company, Detroit; and H. C. Clatfelter Company, Ferndale, Michigan.

He had been affiliated with Syracuse Chapter, ASTE, since 1940.

Howard E. Geiss

The family of S 1/c Howard E. Geiss, 26, was recently notified by the War Department of his death in action while serving in the Pacific.

Howard E. Geiss

Entering the service in June of 1944, he received Quartermaster's schooling at Gulfport, Mississippi, subsequently going to the west coast where he was assigned to a destroyer.

A native of Parma, Ohio, Mr. Geiss had been associated with the Do-All Cleveland Company, as Service Engineer. He was affiliated with Cleveland Chapter, ASTE.

Raymond F. Cook

Raymond F. Cook, 55, Tool Designer at Schwitzer-Cummins Corporation, Indianapolis, recently passed away at the Veterans Hospital in that city after an illness of pneumonia and heart disease.

Raymond F. Cook

A graduate in mechanical engineering, from ICS, Mr. Cook had been associated with a number of Indianapolis industries, including the Allison Division of General Motors Corporation, Stewart-Warner Corporation, Hoffman Specialty Company, R.C.A. Corporation, Chevrolet Body Works, John Deere Plow Works, and Zenite Metal Corporation; as well as with Oliver Plow Works, Bendix Products Division, Bendix Aviation Corporation, and Studebaker Corporation, South Bend.

Born in Veedersburg, Mr. Cook resided at Greenfield, Indiana, at the time of his death. He was affiliated with Indianapolis Chapter, ASTE.

Planned Hospitality Attendance Builder

San Diego, Calif.—As prolific in ideas for the smooth and orderly conduct of their Chapter as for the practice of their profession, San Diego Chapter members have developed a successful procedure for the reception of guests and members.

Borrowing from a neighboring Chapter the plan of using pocket identification cards, they soon found that much confusion resulted from trying to handle large groups of arrivals. Three cardex files in book forms, each consisting of two banks of transparent plastic windows, were secured—two for members and one for guests. Cards were filled in for the entire membership, permanent index cards also being inserted in the windows.

Ticket sellers are instructed to keep a list of all guests making reservations. These lists are turned over to the Treasurer several days before the meeting, along with the receipts from ticket sales. No door sales are permitted because of food rationing and manpower shortage.

A member of the Public Relations Committee, assigned to the project, prepares the guest card well in advance of the meeting. As these cards are relatively temporary, the guest's name is also entered horizontally on the edge for visibility in filing. (See illustration of file.) This Committee is also responsible for refiling the cards when they are returned at the conclusion of each meeting.

Both guests and members are greeted at the door and directed to the files in the foyer, by the Public Relations Committee who act as hosts in introducing visitors to members.

Commenting on the results attained, Gerald R. Bradbury, alert Public Relations Chairman, says, "We can recommend this plan for breaking down a guest's reserve and in developing a friendly, receptive gathering.

"New member services are being inaugurated as rapidly as the need arises. Our problem last year was to build stronger meeting and member interest. This year we have a definite project to expand committee activity, leaving the officers free to concentrate on meetings, programs and policy. More members can thus participate in the operation of the Chapter, sustaining their own interest and creating a pool of future officer material—something which cannot be overlooked if the good work of one administration is to be carried on and enlarged from year to year.

"During the joint monthly meetings of our Executive Committee and Committee Chairmen, difficulties are ironed out, each officer having, at all times, an intimate knowledge of Chapter functions. Only vital business of true member interest is brought up at our regular meetings."

Another feature of San Diego hospitality is ride sharing. At the close of each meeting a show of hands is requested from drivers with room for extra passengers. Those desiring transportation have but to observe the hands raised as the various districts are called. This service is much appreciated by members living in sections where public transportation is infrequent or unavailable.

Shows New Techniques in Duplicating

St. Louis, Mo.—The June 7 meeting of St. Louis Chapter, held at the Melbourne Hotel, featured Elton Miottel, Customer Research Engineer, George Gorton Machine Company, Racine, Wisconsin. Mr. Miottel presented a Kodachrome sound film, "An Exact Duplicate," showing the latest techniques in tracer-controlled milling, duplicating and engraving.

Elton Miottel

Actual jobs were shown in operation, with an informative discussion from the floor following the screening of the film.

Carbide Tool Applications

Pontiac, Mich.—A dinner meeting at the Roosevelt Hotel preceded the technical session sponsored by Pontiac Chapter, June 21.

Representatives of Carboloy Company, Detroit, presented an illustrated lecture describing Carboloy and its applications.

Two war films were shown as an additional feature.

Resourcefulness Will Assure Full Production

New Haven, Conn.—Escaping the city's torrid temperatures, 65 members and 40 guests of New Haven Chapter enjoyed a breeze-swept dinner meeting June 15 at Wilcox's Pier Restaurant, Savin Rock, West Haven.

Principal speaker was Edwin J. MacEwan, Executive Vice President and Secretary of the New Haven Chamber of Commerce. Through his many official connections with local and national organizations, Mr. MacEwan was well-equipped to present the topic, "Production Looks Ahead to Post-War Problems."

Commending Tool Engineers for their splendid work in converting from civilian to war production, he emphasized the urgency of beginning immediately the task of reconverting to a peacetime economy. Describing new products to be manufactured, he pointed out that Tool Engineers must plan and meet changes to maintain maximum production.

Mr. MacEwan's address was considered by many to be one of the outstanding programs of the year.

1. Public Relations Committeeman M. A. Gould of San Diego Chapter hands Mr. Rothhammer of Rohr Aircraft his previously-prepared guest identification card, while other ASTE'ers stand ready to greet him and introduce him to the membership. Another guest, at left of Mr. Gould, has just been escorted to the registration desk. 2. A closeup of cardex guest file, the novel device used by San Diego Chapter for identifying guests rapidly and efficiently. Cards are filled out in advance, from lists of names submitted by ticket sellers, and filed alphabetically. Guest's name is also entered on the horizontal edge of the card, for visibility through the plastic window. 3. Ray Peters (left) of San Diego Chapter receives his pocket identification card from James Meers, a member of the Public Relations Committee, while John Wurzburger looks on.

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Builders of ASTE

Joseph A. Siegel
President 1932-33

By O. B. Jones
Society Historian

Several years ago your Historian was asked to secure from each Past President of the American Society of Tool Engineers an outline of the highlights of his year at the helm. The idea was that the publication of their sketches would be interesting to the present membership, might serve as a guide to present and future officers, and engender a deeper appreciation by all of the struggles and triumphs incident to the founding and maintaining of one of the largest engineering societies.

O. B. Jones

It was not intended that the struggle and triumph of obtaining those sketches from the scattered Past Presidents was to be a part of the story. It was accomplished at last, though one of them had to come out of France as the second world war was closing ports of exit, sending one of our Past Presidents scurrying to safety. You will hear more of this when Bert Carpenter's interesting chapter of this series is published.

The other afternoon, before leaving for his annual vacation, Joe Siegel, the George Washington of the Society, called the Historian and indicated that, in some mysterious manner, the wheels of the mill had ground around to the point where the initial chapter of the series was to be ready for the printer within two days.. Then the hunt started. The Historian's secretaries had become Wacs, Waves and wives and the present brunette's blue eyes weren't meant for looking for such prosaic things as misplaced historiettes. Her decision was that they had been misfiled by one of the preceding brown-orbed blondes. At home, dressers, filing cabinets, kitchen cabinets and linen cabinets had their drawers inverted to no avail. So Joe's chapter will be by proxy.

Joe Siegel was elected president of the American Society of Tool Engineers Thursday evening, March 3, 1932. Committees were formed immediately and evidently functioned superbly, for in May of the same year the first monthly publication appeared, carrying on its front cover the Society's present emblem, designed by William J. McKeen of the Emblem Committee headed by Fred L. Hoffman. In this first issue of the Society's paper, the Membership Committee, Chairmanned by William H. Smila, reported an initial chapter membership of 286 and their determination to "reach as a goal a total membership of 1000 for 1932." In September, the Standardization Committee was organized under the chairmanship of Edward C. Lee.

J. A. Siegel

At the November meeting of the Board of Directors (they met every month in those hectic days of the depression) it was decided "because of the present industrial condition" to reduce the initiation dues to $5.00, and annual dues to $3.00 for Seniors, $2.00 for Juniors, and to carry a "Positions Wanted" column in the monthly publication.

The Secretary's first annual report by A. M. Sargent stated, "statistically, you have sponsored as a Society approximately 5919 *Journals* mailed (*The Tool Engineer* was initially titled *The A.S.T.E. Journal*), 4170 letters and statements mailed, 165 checks issued, 705 checks and accounts received, 680 telephone calls made, 467 members investigated and entered, 558 prospective members canvassed and catalogued." The boys were really co-operating with Joe.

Banks throughout the nation closed for an extended holiday during Joe's administration (it wasn't his fault) and nothing was accepted for cash except stuff you could not make a dent in with your teeth, and not much of that. Checks were taboo.

In turning the office over to his successor, Joe's "farewell address" ended with these words: "Our Society came into being from the grouped ideas of men who, while possessing aggressiveness and leadership, seemed imbued with that virtue of unselfish timidity so well exemplified by Mr. Jones at that first meeting."

It was upon this foundation of honest, sound and progressive principles of cooperation that our Society was founded and to which we have strictly adhered in our attempts to reach that unattainable goal—perfection in the profession of Tool Engineering.

Throughout the years Joe has retained an active interest in the Society, serving in various capacities. At present he is Chairman of Detroit Chapter's Nominating Committee and heads the Tellers Committee recently appointed by President Briner.

[Editor's Note. The author of this column, O. B. Jones, President of the Detroit College of Applied Science, is the "Daddy of the Society," having developed the idea of an organization devoted to the advancement of the profession of Tool Engineering. It was his perseverance and contagious enthusiasm which resulted in the founding of a Society destined to become one of the largest in the field of Engineering.

During the first three years of the Society's existence, Mr. Jones served one term as a member and two as Chairman of the Publicity Committee, the group responsible for the establishment and publishing of *The A.S.T.E. Journal*—predecessor to *The Tool Engineer*. He also headed up the editorial staff of the new publication from 1932 to 1935.

In recognition of his distinguished service to the Society, he was elected an Honorary Member and appointed permanent Historian.

Although his industrial background includes 29 years of engineering experience, "O. B." sums it up by saying, "I don't know much of anything, but I'm a fairly good rabbit hunter."]

Boston Chapter At Play

Random shots of Chapter 33's June outing at the United Shoe Machinery Country Club in Beverly, Mass. 1. Second Vice Chairman Jack Ryneska keeps score of the various events. 2. Ernst P. Krippendorf greets Ralph Robbins. At right Walter Winfrey looking down the fairway. 3. Andrew and John Reid do their bowling in the wide open spaces. 4. Waiting for the tee-off.

Returns to Bausch & Lomb From Air Forces

Rochester, N.Y.—Receiving an Honorable Discharge after 22 months' service in the Army Air Forces, Burt A. Borges has resumed his connection with Bausch & Lomb Optical Company as a tool designer and tool maker.

While information concerning Mr. Borges' military activities is still somewhat censored, it is known that he was engaged as an aeronautical specialist on automatic piloting and bombsight equipment.

In advising the Society of his return to civilian life, Mr. Borges, a member of Rochester Chapter, expressed his pleasure in perusing his accumulated file of *The Tool Engineer* and his appreciation of the ASTE services maintained during his absence. "I am proud to have been able to serve my country actively to protect and preserve such a fine organization," he said.

THE P X

Hdq's. AGAS - APO 627
% Postmaster
New York, New York

Dear Sir:

I wish to take this opportunity to extend congratulations and praise to all the Tool Engineers throughout the country, for the magnificent work they have accomplished. I have seen examples of their efforts and ingenuity throughout India and China, and it certainly makes one feel proud that he is a member of the organization chiefly responsible for the superior equipment and material produced by the United States.

The roads here in China offer a trying test to every type of military vehicle, yet the U.S. trucks keep moving ahead, operating very efficiently and at all times shortening China's life line. This is indeed a feather in all of your caps, and I say along with millions of others, "Thanks, and keep up the good work."

When one knows that he has technical skill behind him such as the American Society of Tool Engineers stands for, there is little doubt that the time is not too distant when total victory will be ours.

Yours very truly,
Private Ed. F. Vandenberg,
36951149
Detroit Chapter

* * *

Co. "A" 1891st Engr. Avn. Bn.
A.P.O. 627
% Postmaster
New York, New York

Gentlemen:

I have been receiving my copies of "The Tool Engineer" quite regularly and for that my sincere thanks.

Congratulations are in order for the splendid job done on the February issue. I think it an excellent idea that the Society will do its own publishing in the future.

"The Tool Engineer" helps a great deal in keeping me somewhat up to date, and its pages are shared with another ASTE member in this organization.

It is unfortunate that the outfit to which I am assigned has no connection with the tool engineering profession, so one is naturally bound to backslide to some extent, but I'll be glad to get back and into harness again.

Sincerely,
Cpl. Alfred R. Scheid,
35630461
Detroit Chapter

* * *

Co. H 506th Parachute Inf.
% Postmaster
New York, N.Y.
A.P.O. 472
U.S. Army Paratroops

ASTE Members:

I'm dropping you a line to let you know that everything here is running smoothly, and that I am in the best of health.

I am with the 101st Airborne Division, more commonly known as "The Battling Bastards of the Bastion Bastogne." I'm sure you've all heard of Bastogne, where our unit received its first Presidential Citation. It's a great outfit, fellows.

Now that the base censor is off, we can write more freely. This little village of Saalbach, Austria, is located in a valley, and surrounded by the snow-peaked Salzburg Alps. The grandeur of these mountains just can't be put into words.

I pause now to congratulate each of you for your splendid co-operation in the war effort.

My best regards to every member of the Society—may it grow and prosper in the future.

Fraternally yours,
Pvt. Joseph S. Chomin,
36471080
Detroit Chapter

* * *

Co. E - 148th Inf., A.P.O. 37
% Postmaster
San Francisco, Calif.

Gentlemen:

Here is one of your distant members reporting from the Philippines. My permanent address is as above and I wish that you would send all literature there, for I wish to keep in touch with the latest developments. In this way perhaps I won't be so rusty when I return to civilian life.

My friend and former supervisor Harmon S. Hunt of Greater New York Chapter writes to me often, keeping me in touch with the activities of my Chapter.

We've been in some action and, altho we've had some casualties, the Japs have had many more, for we were successful in our mission. Now with the surrender of Germany, the Allies will be able to concentrate on Japan and make short work of that.

Regards from a distant Member,
Pfc. Waldemar S. Pozner,
42074120
Great New York Chapter

Ladies Night Dinner Dance

Windsor, Ont.—A party of 186 members and feminine guests attended Windsor Chapter's Second Annual Ladies Night, June 1, at Lakewood Golf Club.

The dinner program was opened with a toast to the King by Chairman C. G. Sampson who introduced the head table guests.

Dancing was enjoyed throughout the evening.

Industrial Future Bright for San Diego

San Diego, Calif.—Postwar industrial employment double that available prior to 1940 is estimated for San Diego, according to the Day and Zimmerman Report, a digest of which was presented to San Diego Chapter, meeting June 14 at the San Diego Women's Club.

The speaker, Harry E. Whittemore, Manager of the Industrial Division, San Diego Chamber of Commerce, reviewed conditions leading the Postwar Planning Committee to engage Day and Zimmerman Engineering Company to make a scientific survey of the City's prospects. Funds to finance the project were subscribed by private industry.

In 1940 when San Diego showed the greatest population increase among cities of 200,000, it was found that local economy was based upon four sources: the Navy, tourists, agriculture and industry, with three jobs for every two that existed previously.

A field crew of five men worked about five months on the preliminaries of the engineering survey, the complete 1600-page report requiring a year to compile. It indicates a definite possibility of further expansion in the port, commerce, agriculture, food processing and public utilities fields.

Forty-third in population size, San Diego has risen from 79th to 28th place among industrial cities. Manufacturing output has increased 61%, against a 40% increase in population. A partial list of new industries recommended includes hosiery, tanning, oil heaters, porcelain enamel, cooking utensils, hospital equipment, metal furniture, electrical appliances, assembly of farm equipment, coin-operated dispensers, lawnmowers, costume jewelry, quick freezing of foods, and sporting goods.

Plans include the financing of an organization to rent or sell plants which will be abandoned after the war, following the scheme employed in Manchester, New Hampshire, where vacant textile mills were sub-let to groups of small industries, saving the community from disaster, the speaker indicated.

San Diego Chapter hears results of industrial survey of city, made by Day & Zimmerman Engineering Company, from Harry E. Whittemore, Manager of Industrial Division, San Diego Chamber of Commerce, who is being introduced by Chairman W. H. Asmus (right).

Toronto Frolics On Field Day

Toronto, Ont.—Gathering to apply their precision training to the field of sports, Toronto Chapter members enjoyed their Annual Field Day, June 22, at the Elms Golf and Country Club, Weston.

One of the most novel events was a competition to drive a nail completely into a piece of oak into which a battery of washers had previously been inserted on inch from the top. A machinists' hammer with a handle shaped like a dog's hind leg was the implement supplied.

After many unsuccessful attempts to drive a nail straight, the contestants admitted defeat and forfeited the cigar award.

A bean guessing contest proved that the members of Chapter 26 know their beans, many guessing almost the exact number.

Proceeds from this and the nail-driving contest netted a substantial contribution to the Hospital for Sick Children, Toronto.

Over 150 prizes, many donated by members, were distributed to winners of the various sporting events in which the competition, with few exceptions, was strictly mental. Included on the program were a golf tournament and a softball game, enjoyed equally by participants and spectators.

Chairmanned by Paul M. Jardine, the outing, considered one of the best ever sponsored by the group, provided a day of fun and good fellowship for the large attendance which included all Past Chairmen of the Chapter.

Dr. Hilton Ira Jones tells Detroit Chapter of some of the chemical discoveries destined to revolutionize postwar industry. A portion of his exhibit is shown in the lower part of the photograph.

Chemical Discoveries Create New Industries

Detroit, Mich.—Having the rare faculty of making scientific developments fascinating and vivid to the lay mind, Dr. Hilton Ira Jones, Managing Director, Hizone Laboratories, Wilmette, Illinois, told Detroit Chapter of some of the remarkable things chemists are doing. Dr. Jones presented his address, "Peeps At Things To Come," at the June 14 dinner meeting held in the Rackham Memorial Building.

The speaker listed products made from cotton seeds, through chemical research, including gun cotton, salad oil (some of which is exported, refined, and then imported from Italy as pure olive oil), toilet soap, shortening and margarine.

Displaying bright swatches of cloth colored with dyes derived from corn cobs, Dr. Jones predicted that, in the future, corn would be raised for this purpose as well as for food.

He also mentioned a derivative of waste pineapple to be available for household use in tenderizing meat.

Among his exhibits was a piece of flexible, plastic water pipe which can be installed in existing buildings by drawing it through the walls. Ends are joined simply by heating on a hot plate and pressing together, creating a sealed joint as strong as the original pipe. Underground sprinkling systems may be built of non-deteriorating plastic hose, with a co-efficient of expansion, which will not be subject to breakage through freezing.

While Nylon hose can be produced for a few cents per pair, the speaker indicated, prices will not drop until customers accept high quality at low cost.

N. J. DeBoer

Mr. N. J. DeBoer, Assistant in Charge of the Fish Division, Michigan Conservation Commission, was also a guest speaker, discussing "Bass and Pan Fishing."

Among distinguished visitors present were Capt. Kao-Hwa-Lo of the Chinese Army, who is stationed at the Chevrolet Gear and Axle Plant; M. B. Johns, Director and Works Manager, and J. Lonsdale, Productive Engineer of the N. B. Johns Company, Ballart, Australia, guests of J. F. Slavic of the Warner & Swasey Company.

Carbide Steel Milling Described By Frommelt

Kansas City, Mo.—Dr. H. A. Frommelt, Chief Research Engineer, Kennametal, Inc., Latrobe, Pennsylvania, was the principal speaker at the June 6 dinner meeting of Kansas City Chapter.

While lecturing on the correct design and application of carbide milling cutters, Dr. Frommelt showed slide films, afterward displaying samples of the tools discussed and answering questions from the floor.

New and interesting techniques for "Tooling For Better Internal Grinding" were presented by W. J. Augustenovich, Service Engineer, Bryant Chucking Grinder Company, Springfield, Vt. A technicolor sound film illustrated his talk. In the ensuing open forum, the speaker answered many questions in an interesting and informative manner.

Data Sheet Survey Under Way

The National Standards Committee is mailing to each member of the Society a comprehensive questionnaire—it's comprehensive in the information it seeks, but simple to answer for it requires only a check mark in a "Yes" or "No" column.

Are data sheets of value to you in your work? What information, if contained in these sheets, would be of greatest value to you? What kind of index do you favor? These are indicative of the types of questions to which affirmative or negative replies are sought in the Standards Committee survey now in progress.

William H. Smila

Harold T. Johnson

This Committee, headed by Past National President William H. Smila as Chairman, is endeavoring to plan a complete program of activities in the field of standards. Commenting on the survey, Mr. Smila says, "If the members will return the questionnaires promptly, indicating their preferences, we'll do our best to produce for them results which will be of the greatest possible assistance.

"We're making the job easy. We're merely asking each member to place check marks where he believes they belong on the single-page form, promptly returning it in the accompanying addressed and stamped envelope.

"Only one question cannot be answered 'Yes' or 'No.' Each member is invited to use the reverse side of the sheet for his suggestions or opinion of what the data sheet program should compromise. Our committee hopes that replies are received promptly; that we shall have an opportunity to give the members what they want."

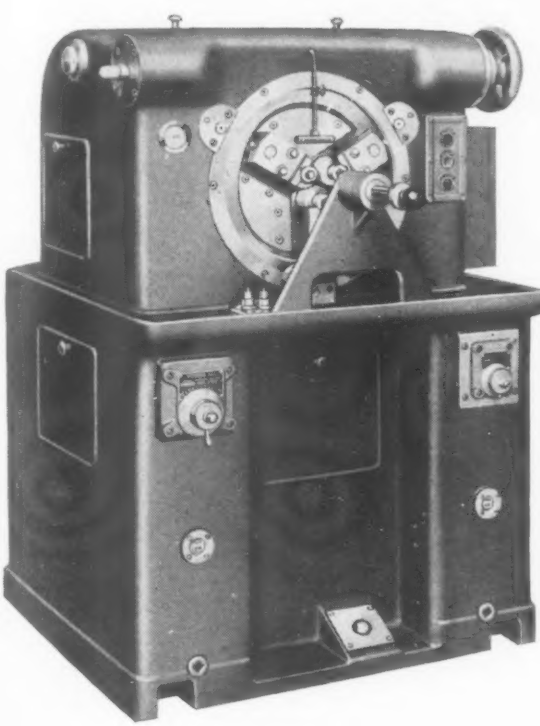
Frank Wilson

D. D. Burnside

Chairman Smila, Master Mechanic, Plymouth Div., Chrysler Corp., Detroit, is being assisted by Harold T. Johnson, Director, Standards Section, General Motors Corporation; Frank W. Wilson, the Society's Handbook Editor, who serves as Secretary of the Committee, and Immediate Past President D. D. Burnside, of the Engineering Department, Republic Aircraft Products Division, Aviation Corporation, Detroit.

NEW

National Acme Hydraulic Thread and Form Rolling Machine



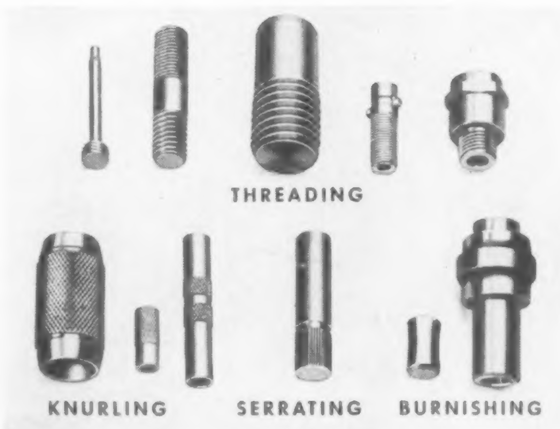
This new National Acme production tool—a Thread and Form Roller, hydraulically operated and completely automatic — is especially built for economical production of smooth, accurate threads and forming work, to the finest automotive and aircraft precision standards.

Three threading or forming rolls, each supported by anti-friction rolls directly in line with the work, insure uniform pressure. This avoids distortion — especially important for second operation on hollow work.

Two standard heads are available and are interchangeable—one for $\frac{3}{8}$ to $\frac{9}{16}''$ work and one for $\frac{9}{16}$ to $1''$ work—$1\frac{1}{2}''$ maximum length. Other sizes on application.

Hand fed, this machine will turn out 900 pieces per hour, and magazine fed, up to 2000 pieces. It does not require an experienced operator, and affords unusually long life for thread rolling tools.

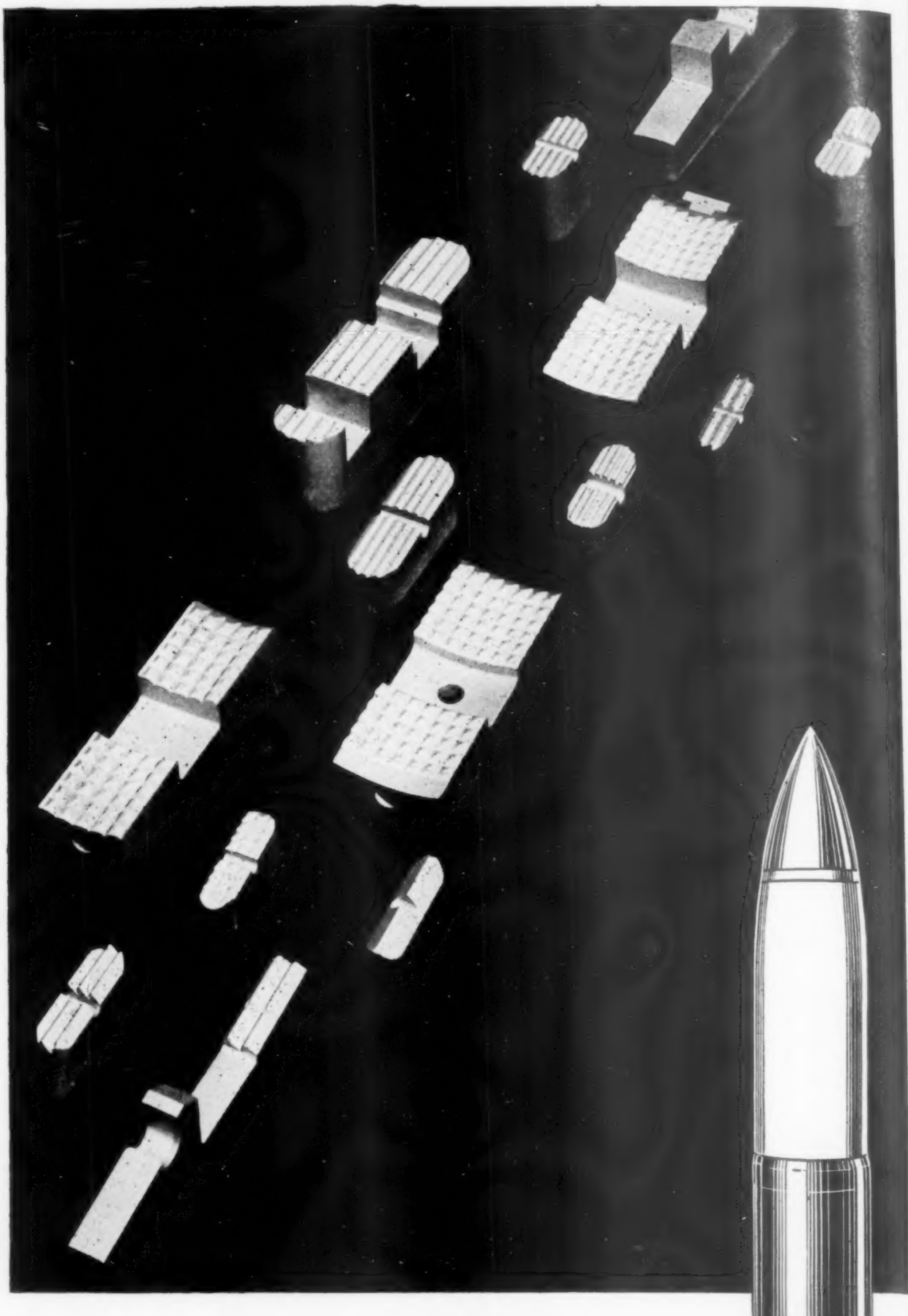
We'll gladly give you additional data, prices and delivery dates.

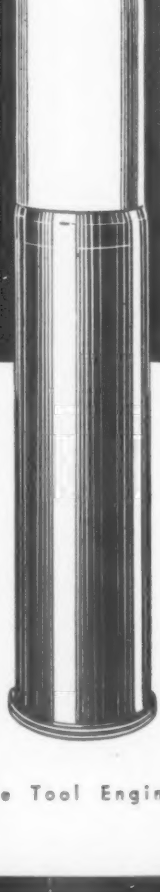


The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing



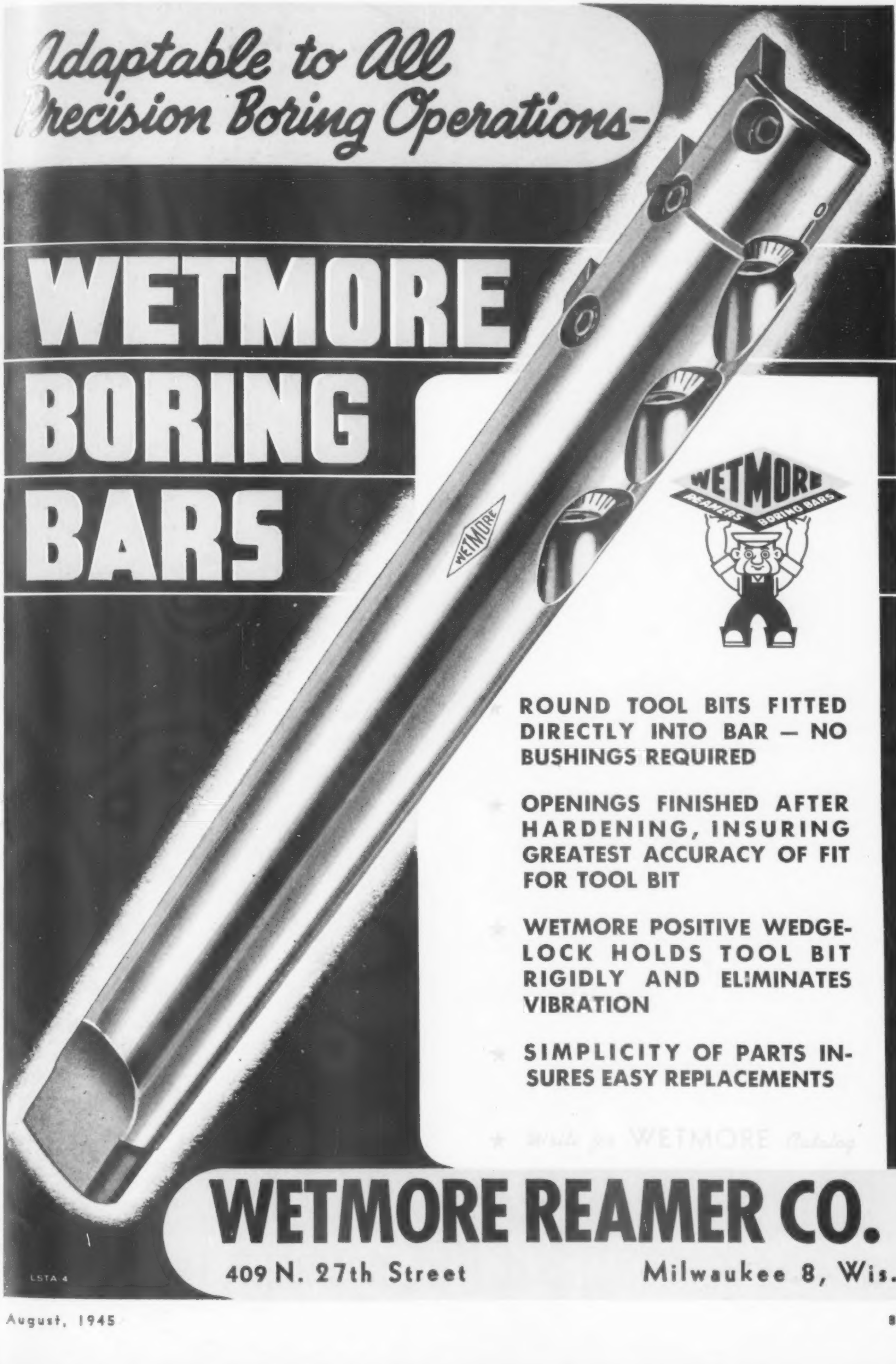


Convoy . . . with teeth in it

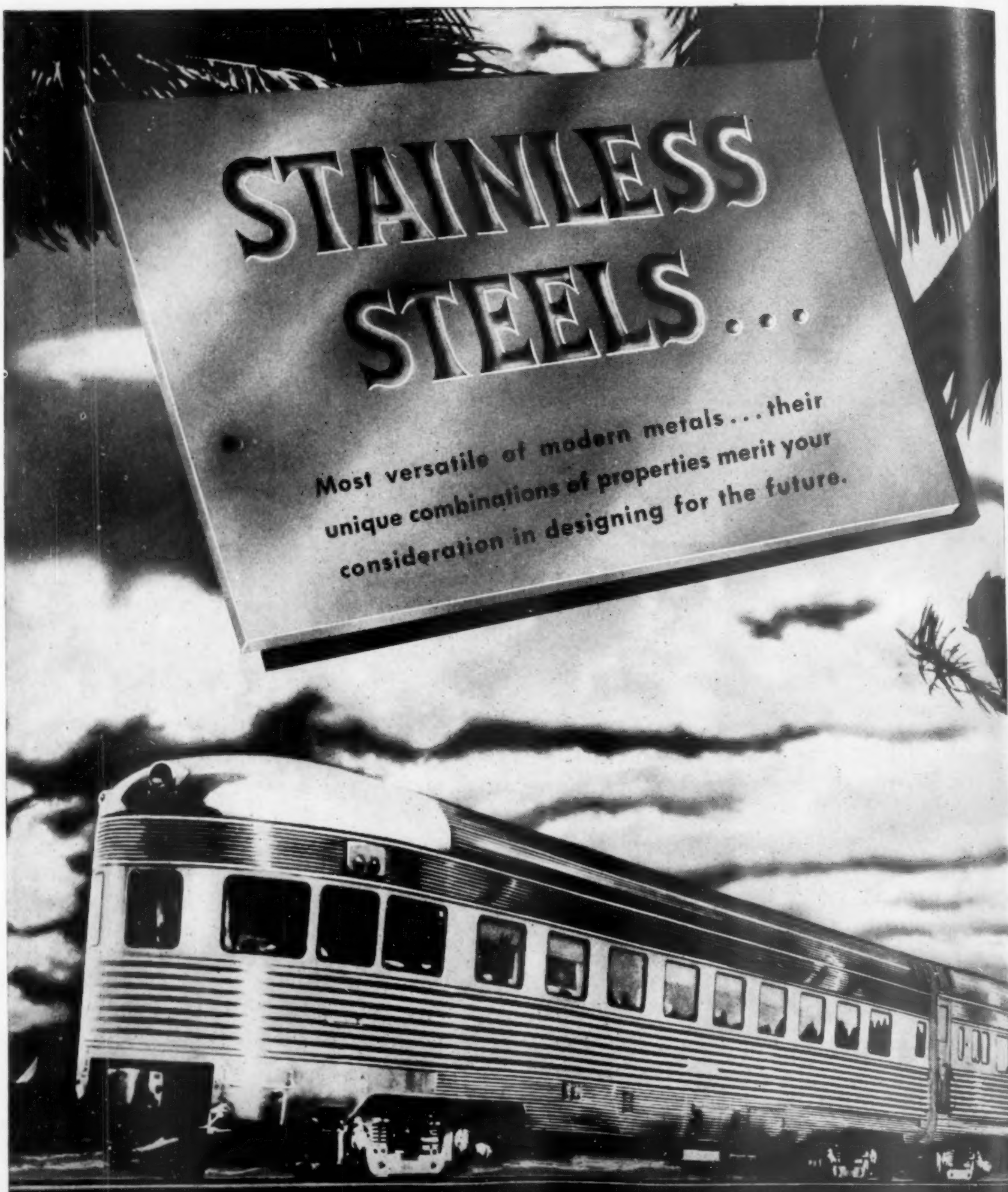
Parts to be highly finished or re-machined are gripped in steel, held in place in the lathe with Olofsson-made jaws of great durability and holding power. This industrial "convoy" is another example of Olofsson skill in the design and manufacture of precision tools, dies, jigs, gages, fixtures and special machines for industry.

OLOFSSON TOOL AND DIE CO., LANSING, MICHIGAN

CHICAGO ENGINEERING OFFICE — 600 SOUTH MICHIGAN AVENUE



Adaptable to All Precision Boring Operations-
WETMORE BORING BARS
WETMORE
WETMORE REAMERS BORING BARS
ROUND TOOL BITS FITTED DIRECTLY INTO BAR — NO BUSHINGS REQUIRED
OPENINGS FINISHED AFTER HARDENING, INSURING GREATEST ACCURACY OF FIT FOR TOOL BIT
WETMORE POSITIVE WEDGE-LOCK HOLDS TOOL BIT RIGIDLY AND ELIMINATES VIBRATION
SIMPLICITY OF PARTS INSURES EASY REPLACEMENTS
Write for WETMORE Catalog
WETMORE REAMER CO.
409 N. 27th Street
Milwaukee 8, Wis.



● This Streamliner exemplifies the enduring strength and beauty of stainless steel. Characterized by endurance under corrosive conditions, chromium-Nickel stainless steels permit reduction of bulk and dead weight...without sacrifice of strength or safety.

• • •

International Nickel are miners, smelters and refiners of Nickel, an important ingredient of the stainless steels, but do not produce stainless steels. If interested, please communicate with established sources of supply for stainless steels.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N.Y.

HYDRAULIC BALANCE

CANCELS OUT BEARING LOADS

And Means MUCH LONGER PUMP LIFE

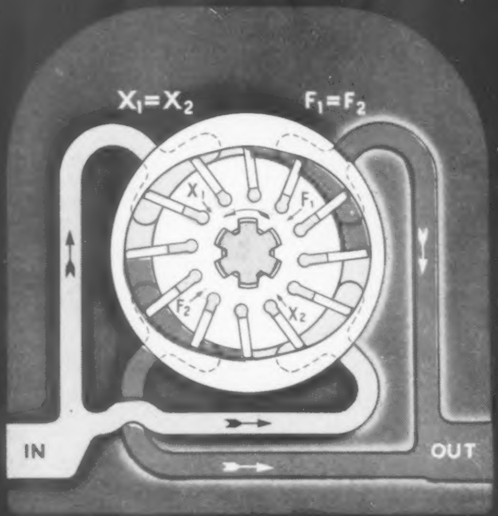


Diagram showing patented "Hydraulic Balance" construction.

VICKERS.
Balanced
VANE TYPE
PUMPS

As illustrated by the diagram above, equal and opposing pressure areas are provided on the outlet side and on the inlet side of Vickers Balanced Vane Type Pumps. The equal and opposing radial hydraulic thrust loads cancel each other . . . consequently there are *no* bearing loads resulting from pressure. The major cause for wear is thus completely eliminated and the result is much longer pump life. This "Hydraulic Balance" construction is exclusive with Vickers Vane Type Pumps; it also permits an unusual design compactness and is an important reason for the exceptionally high efficiency of these pumps.

Vickers Balanced Vane Type Pumps are available in single-stage for 1000 psi (see Bulletin 40-25a); two-stage for 2000 psi (see Bulletin 40-16) and also two-pressure, large-small volume (see Bulletin 38-14). Vickers Application Engineers will gladly discuss with you the many different types of hydraulic power and control circuits on which these pumps have improved machine performance. Write the office nearest you.

VICKERS, *Incorporated* • 1416 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering Offices: CHICAGO · CLEVELAND · DETROIT · LOS ANGELES · NEWARK · PHILADELPHIA · ROCHESTER · ROCKFORD · TULSA · WORCESTER

Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

CONSTANT DELIVERY PUMPS · FLUID MOTORS · DIRECTIONAL CONTROLS · VOLUME CONTROLS · PRESSURE CONTROLS · CONTROL ASSEMBLIES · VARIABLE DELIVERY PUMPS

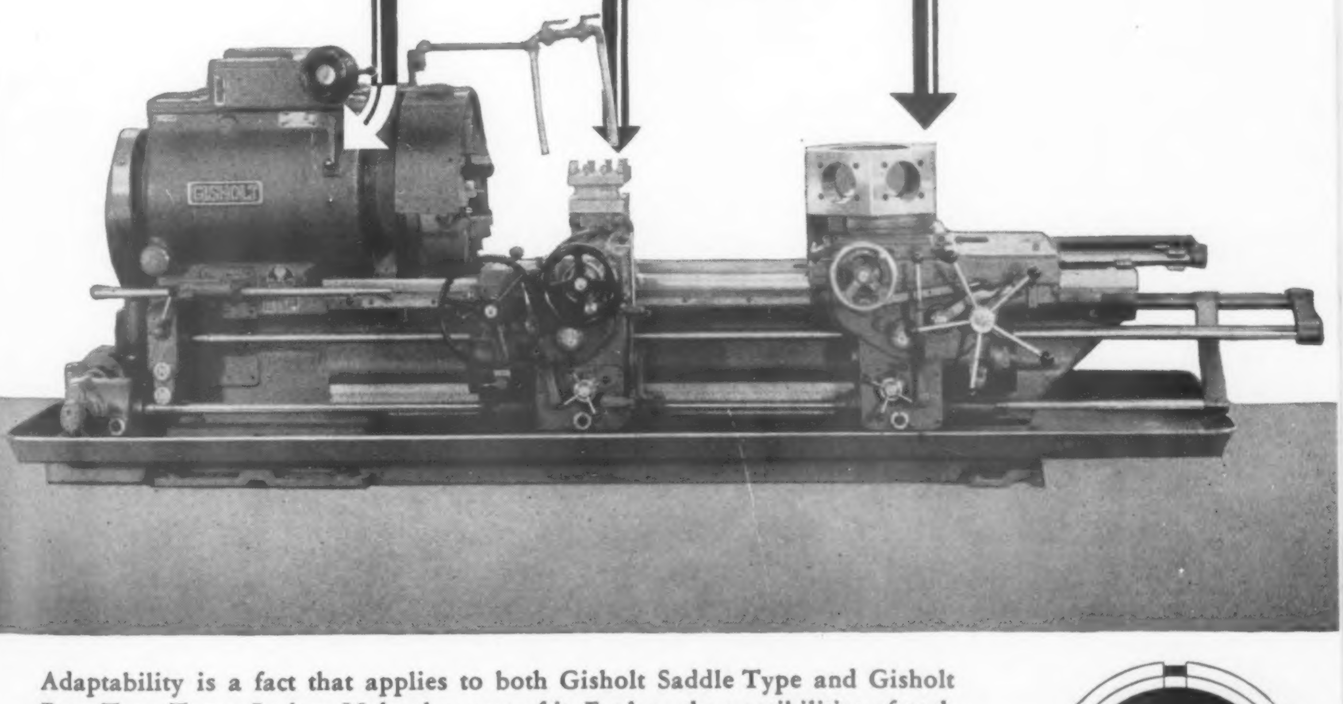
Adaptable . . .

Here's a Gisholt advantage that pays big dividends . . . the ability to handle a broader range of work when the need arises. Take, for example, the Gisholt 4L Saddle Type Turret Lathe. A big machine, to be sure, yet its flexibility and ease of operation enable it to handle smaller work too. Here are a few of the reasons why:

1 Hydraulic clutching and braking make it possible for the operator to start, reverse, or stop the spindle—as quickly and as effortlessly as on many smaller machines. One easy movement of one lever is all it takes. Response is instantaneous, smooth, positive.

2 Power rapid traverse for the side carriage is provided not only for longitudinal movement but also for in-and-out movement of the cross slide. Here's greater ease and speed for bringing tools quickly into cutting position.

3 This massive cross-feeding hexagon turret is more accurate—more adaptable with its 16 reversible feeds and automatic feed trips for both longitudinal and cross feeds. It can be locked rigidly on center for bar work—or chucking work with piloted tools.



Adaptability is a fact that applies to both Gisholt Saddle Type and Gisholt Ram Type Turret Lathes. Make the most of it. Explore the possibilities of each type to assure the most flexible and economical set-up for your own production. Ask for literature.

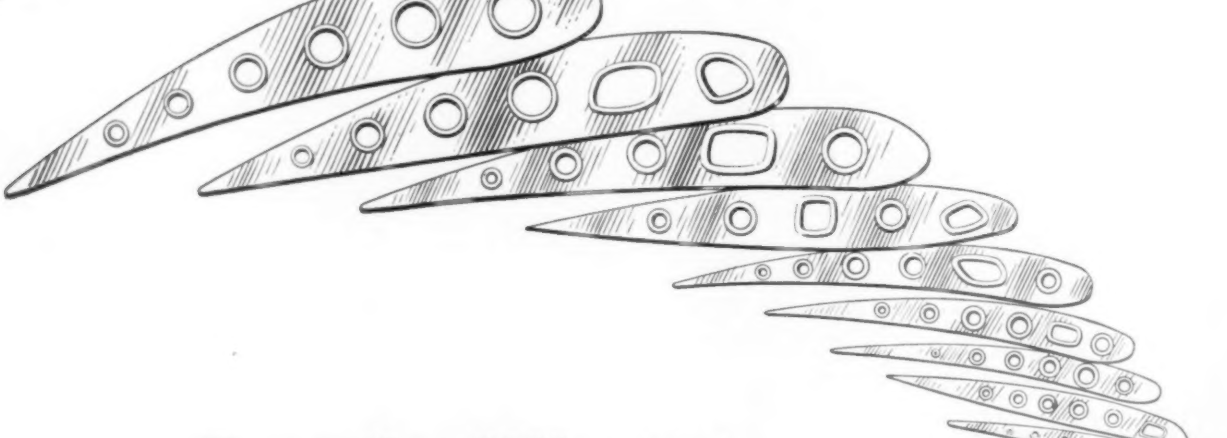
GISHOLT MACHINE COMPANY • *1257 E. Washington Ave., Madison 3, Wis.*

Look Ahead...Keep Ahead...With Gisholt Improvements in Metal Turning

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

MASS PRECISION AND AIRFOIL SECTIONS



***Exactly* different**

Ever hear of a machine to make parts that are *exactly* different? That's actually what Nichols did for a group of aircraft designers . . . they needed accurate metal models of wings, 36 inches long and 6 inches wide, with an infinite variety of airfoil sections—and they needed them in a hurry for wind tunnel tests.

Nichols made such a machine to turn out *any* desired wing section accurately and quickly—so quickly in fact that the engineers, with this new tool, made nine years' progress in one!

This is an example of Nichols' understanding of precision production problems, of Nichols' unlimited source of engineering methods. In short, a sample of Nichols Mass-Precision. A booklet showing some of the products made for other concerns will be sent on your request.

W. H. NICHOLS & SONS, 48 WOERD AVENUE, WALTHAM 54, MASS.

"Accurate" *Nichols*

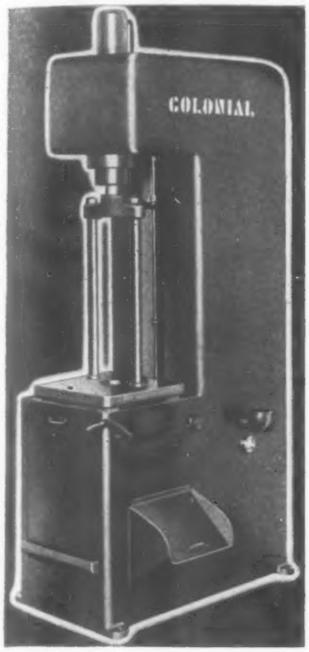
ni

PRECISION ENGINEERING AND MANUFACTURING FACILITIES FOR MASS PRODUCTION

TOOLS OF TODAY

Broaching Press With Pull-Down

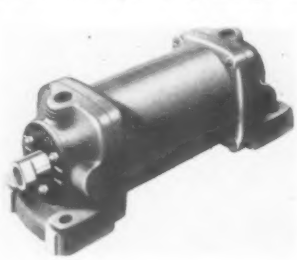
THE COLONIAL UTILITY BROACHING PRESS, manufactured by COLONIAL BROACH COMPANY, Detroit, is now available with a pull-down attachment. This feature, which makes the machine suitable for pull as well as for push broaching, is particularly useful where extreme broaching accuracy is required or where the broaches are too small in diameter to be pushed through the work.

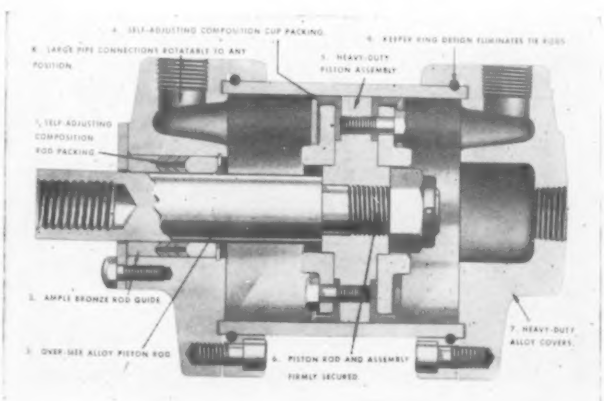


The attachment is tied together, top and bottom, with tie bars; in addition, has two vertical guide rods. The lower tie bar of the attachment carries a puller adapter designed to permit the use of automatic pullers, with alignment accuracy assured through the use of hardened and ground bars for guiding the broach. The guides slide in long bushings pressed into the platen bed.

Air Cylinders Without Tie Rods

AS CLEARLY shown in the sectional view, the new Gerotor double-acting, non-rotating Air Cylinders, made by GEROTOR MAY CORP., Logansport, Ind., are without tie rods. Instead, keeper ring design assures leak-proof construction and permits covers to be rotated in any position for convenient location of pipe connections. The cylinders may be used for 150 lbs. air pressure or for 300 lbs. water or oil service, in the latter case being provided with auto type piston ring construction.

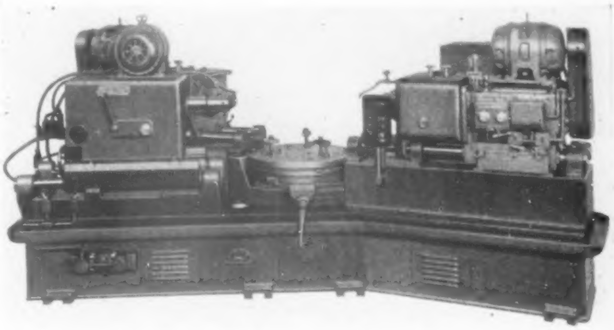




Boring Facing and Tapping Machine

DESIGNED and built by SNYDER TOOL & ENGINEERING COMPANY, Detroit, a special-purpose 3-way machine bores, faces and taps heavy duty valves for use in the oil fields. Boring and facing is done with a four speed, single head spindle which is driven and advanced into the work by a Snyder self contained hydraulic guide bar unit.

In front of one of the two boring units, and to the left of the operator, is installed a lead screw tapping unit which also has a variable spindle speed and which is mounted on a guide bar slide for hydraulic rapid advance. Spindles are equipped with a breech lock and special tapered holes for quick tool exchange.



"Hydro-Tester" For Tubes

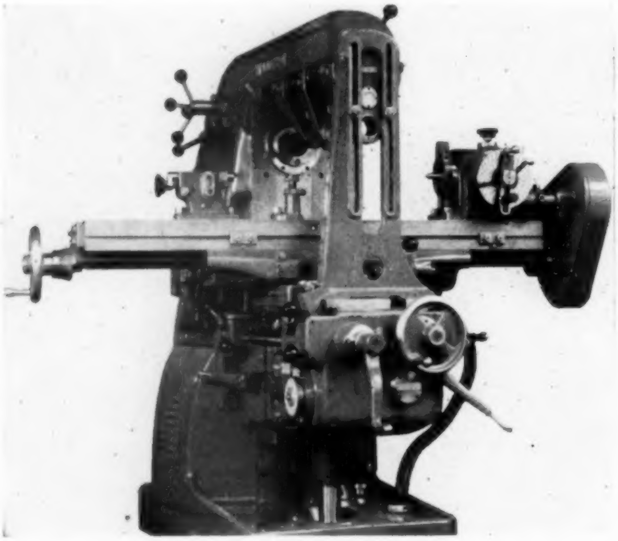
DESIGNED and manufactured by NARRAGANSETT MACHINE COMPANY, Providence, R.I., the new Series 100-5 Hydrostatic Tester is said to be extremely efficient and rapid in operation. Primarily intended for testing rocket tubes, it can be used for hydrostatic testing of tubes or cylinders of almost any size and shape. The machine is of the Narragansett ram type, adjustable to tubes of varying diameters and lengths, and motor operated through reduction gears, with enclosed automatic switches.

Testing is accomplished by introducing water at city pressure—normally 80 p.s.i.—into the cylinder under test while the latter is held between two specially designed steel adapter plates which seal both ends of the cylinder under test. The hydrostatic pressure range may be extended through use of hydrostatic booster and coolant equipment which can be furnished as additional equipment at time of purchase. As designed, however, one operator can accurately test up to 80 cylinders per hour.

Universal Dividing Head

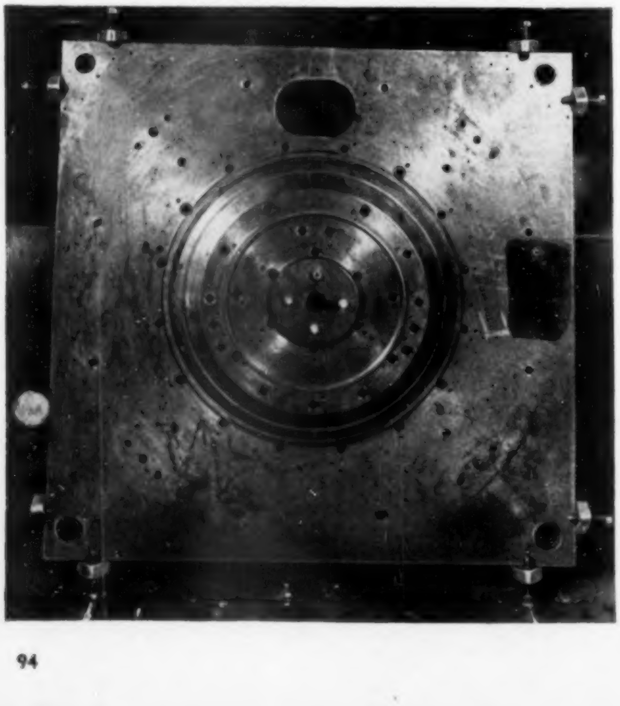
CLAIMED to maintain original accuracy several times longer than conventional types, a new Universal Dividing Head has recently been introduced by MODERN TOOL WORKS, Ltd., Toronto, Ont. This sustained accuracy is insured, on the Modern, by a rigid optical inspection check.

The longer life of the tool, particularly important when dividing heads are constantly used, and especially on spiral milling, is attributed to the use of "Cone-Drive" gearing, produced by *Michigan Tool Company,* Detroit. The net effect of this design, in which the entire length of the worm is in engagement, is to distribute the load over more teeth as well as over a greater tooth area. The result is said to be much lower unit loading of the gearing, with consequent decrease in wear.



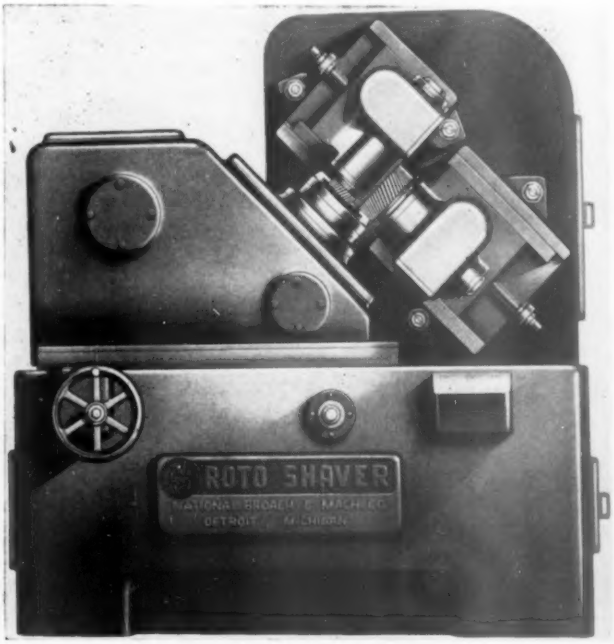
Rings From Tool Steel Tubing

RINGS and bushings may now be made of oil hardening, non-shrinkable Tool Steel Tubing, as illustrated by the large 52 hole jig in the photograph. Information regarding this tubing, which is available in sizes 1" to 15" O.D., may be had from BISSET STEEL CO., 945 E. 67th St., Cleveland 8, Ohio.



"Red Ring" Roto Shaver

PRIMARILY designed for finishing the back face and bore of automotive rear axle ring gears, a new Roto Shaving machine, announced by NATIONAL BROACH & MACHINE COMPANY, Detroit, eliminates the green grinding of these surfaces prior to the gear cutting operation. In other words, Roto Shaving is a rapid, close tolerance green finishing operation for circular, flanged, cylindrical and conical parts which would ordinarily have to be ground at considerably greater cost.



This new machine, for which cutter heads can be made for a wide variety of special applications, may be used with equal effectiveness to finish pressure plates, internal ring gears and other parts. It is especially useful in the finishing of those surfaces which are later used as location points for subsequent machining operations.

It is claimed that surfaces can be Roto Shaved several times faster than they can be ground. For example, the complete cutting cycle, on large truck ring gears, both back face and bore is approximately 15 to 20 seconds, with even better time on passenger car gears. The capacity is ring gear boxes from 4¼" to 9" on gears having an O.D. up to 15⅜".

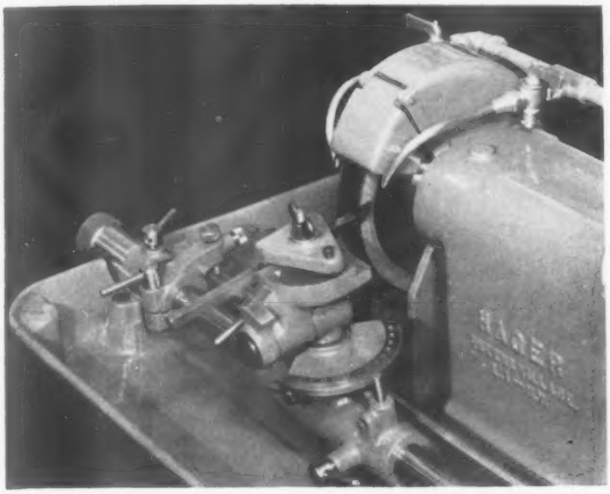
Torque Screw Driver

A SMALL, Special Torque Screw Driver has been added to the line of ZIMMERMAN PRODUCTS, Newington, Conn., manufacturers of torque test stands, tools and other torque equipment. The tool shown is said to be particularly handy and valuable in precision electronics where small screws of any type are to be tightened in materials such as plastics, and where danger of screw breakage is involved. It is adjusted to exact torque by means of a ZP "Torque Watch."

Swiss-Type Carbide Grinder

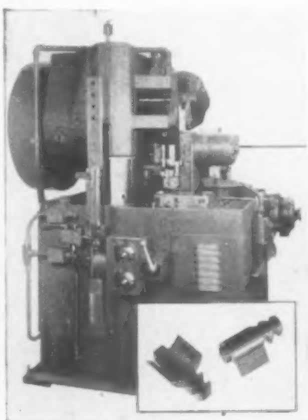
BASED on the fundamental principle employed in Swiss type grinders, a *Carbide Tool Grinder,* developed by E. F. HAGER and SON, considerably speeds up the precision grinding of carbide tools. The interesting feature of the machine is that the tools are clamped in a holder with a built-in protractor, and may then be rough ground and diamond lapped in the same setting by merely sliding from one wheel to the other.

Angular settings are retained while, on the other hand, parallel sides are easily obtained and duplicate tools can be ground and used interchangeably Furthermore, the operator can reach any position, for rake or clearance, without moving from the front of the machine. Nor are skilled operators required since, in the words of the manufacturer, the "skill is built into the machine." Complete data and specifications may be had by writing the maker at 98-02 217th Lane, Queens Village 9, L.I., N.Y.



Automatic Bar Stock Machine

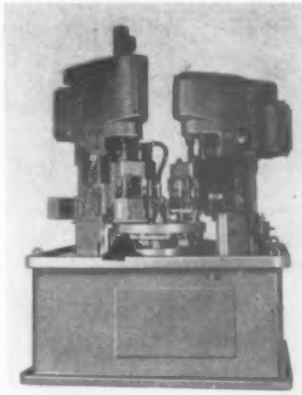
A NEW machine for milling and cutting of parts from bar stock, and entirely automatic so that one operator can run two or several, has recently been introduced by KENT-OWENS MACHINE CO., Toledo 10, Ohio. The operator needs only to insert new bars as they are exhausted.



The head, which is hydraulically actuated, can be furnished with a single spindle, for simple cut-off operations, or with several for both milling and cutting off, as desired. Stock is automatically fed against an end stop by a torque motor and hydraulically clamped. Complete specifications and performance data may be had from the maker.

Automatic Indexing Machine

THE machine illustrated is a six spindle, hydraulically operated automatic indexing machine, tooled to step ream and thread malleable iron thin wall conduit connectors and nuts. It is designed and built by KAUFMAN MFG. CO., Manitowoc, Wis.



The reaming head has rapid advance, feed, dwell and rapid retraction, and the threading head is provided with a lead screw that may be changed to suit the pitch of thread to be cut. Drive to the heads is by electric motor through Reeves variable speed transmissions, with extra drives to the hydraulic and coolant pumps. The base is of normalized welded construction, with control units and reservoirs integral.

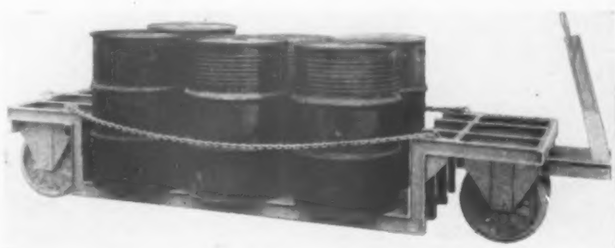
Sine-Line Spacing Checker

SPECIFICALLY designed for the rapid, accurate checking of tooth spacing on gears, a simple, precision gear checker—Model No. 1130—has recently been added to the *Sine-Line* checking equipment by MICHIGAN TOOL COMPANY, Detroit. The machine checks the base pitch and tooth spacing along the line of action on spur or helical gears up to 12″ O.D. and of 18″ maximum shaft length. Worm gears may also be checked.

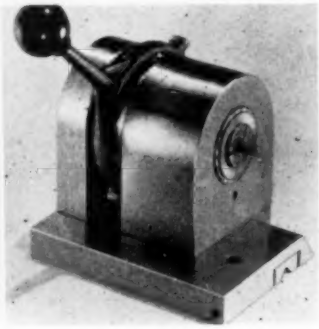
The Model No. 1130, which may be used with the Michigan AY-1 recorder, with chart records of individual tooth spacings as well as total variations, operates on logical mathematical principles and accurately indicates whether the spacing is correct both along the line of action and along the base pitch circle of the gear. Complete information is available from the manufacturer, 7171 E. McNichols Rd., Detroit 12.

Easy Loading Trailer

OF UNDERSLUNG, welded steel construction, the Trailer shown really "gets down to earth" for easy loading and unloading. Capacity is 2½ tons, with platform 38″ × 78″. Wheels are of heavy steel, rubber tired and roller bearing equipped. Complete details may be had from PALMERSHILE CO., manufacturers, 790 So. Harrington St., Detroit 17.



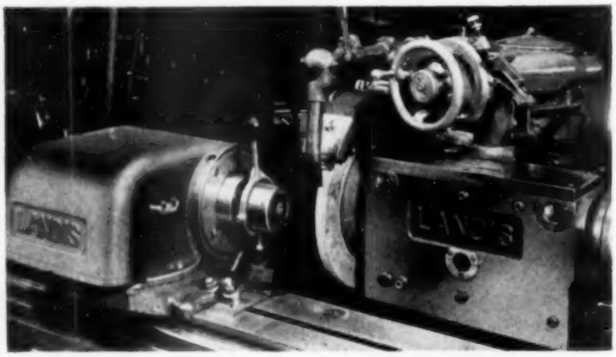
Soft Collet Blanks By Zagar



As "something new under the sun," ZAGAR TOOL, Inc., 23880 Lakeland Blvd., Cleveland 17, now furnishes No. 2 W. & S. and 5-C types of blank collets machined all over, except for the hole, to fit any standard collet attachment. Customers may buy these blanks and bore to meet special hole requirements.

Also in the Zagar line is a special Collet Chuck—upper right—made to fit on a Sheffield grinder for grinding studs and other work which may be held in a collet. While special, as far as adaptation to a special machine is concerned, the device may be modified to meet other requirements.

Of interest, also, is the 1" Zagar Collet Speed Chuck, shown mounted on a 12" × 36" Landis universal grinder, and used for a rather difficult grinding job. Advantages claimed are that the collet does not move endwise as with standard draw types of collets; as a result, length dimensions can be closely held.



Duplex Seam Welder

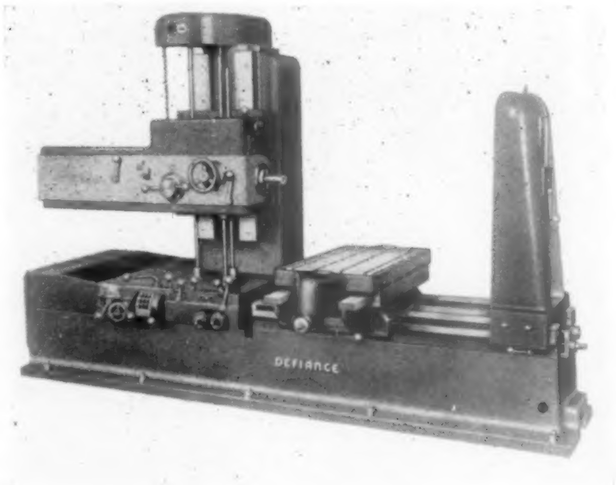
DESIGNED for simultaneous welding of two or more parallel seams on one surface, *Duplex Seam Welders*, a recent product of PROGRESSIVE WELDER CO., 3050 East Outer Drive, Detroit 12, portend definite economies in resistance welding. The machines are air operated and fully automatic, and are available in a wide variety of capacities and sizes.

The work is carried on a table mounted on horizontal slide rails, with the top of the work holding fixture a flat copper plate which provides the lower path for the welding current between the welding wheels. Thus, the platen top becomes the lower electrode for both wheels which, with the lower electrode and transformer, are all water cooled. Complete details may be had from the manufacturer.

New Mill By Defiance

MODEL No. 22—a new 2½" Horizontal Boring, Milling, Drilling and Tapping Machine is announced by DEFIANCE MACHINE WORKS, Defiance, Ohio. It is ruggedly designed to meet every requirement where high production and precision work is required, and is said to be especially suited to the needs of tool rooms for small jig and die work.

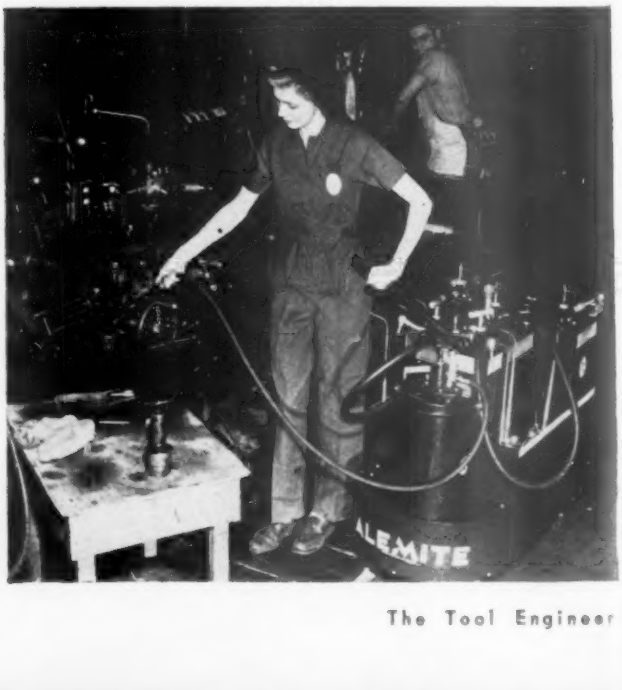
The machine has a number of unique and advanced features, with positive, infinitely variable speeds from 25 to 1600 R.P.M. in either direction, with direct reading indicator for spindle speeds and a brake to stop the spindle. Complete specifications are to be had in a well considered Bulletin, available on request from the makers.



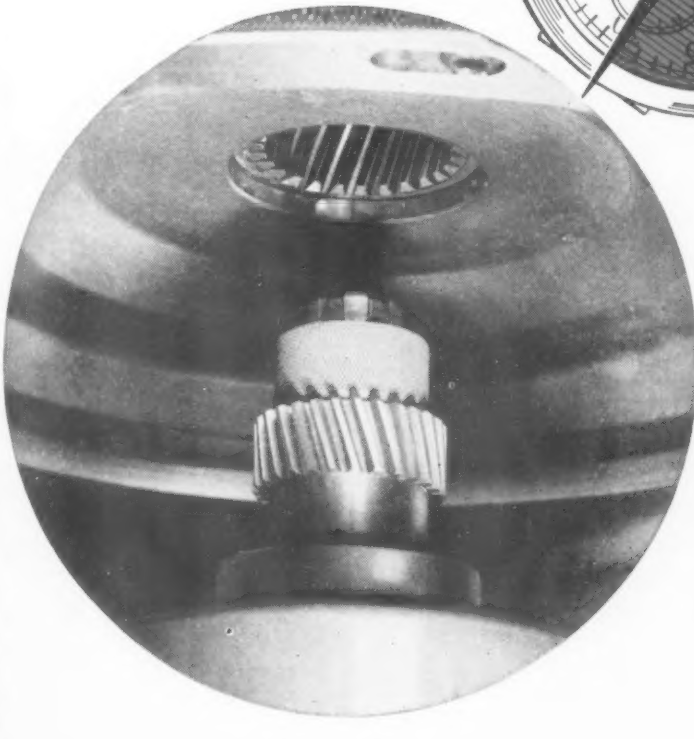
Lubricart For Alemite

DESIGNED to transport and dispense a variety of grades or types of lubricants, a new Lubricart, put out by the ALEMITE DIVISION of the *Stewart-Warner Corp'n* provides a complete, compact and portable lubricating department for industrial plants.

Mounted on 5" ball bearing casters, the new unit is only 21" wide, 31" long and 37" high. Pushed like perambulator, it is intended for one man operation and is able to travel between rows of machines where space is limited. The Lubricart comes in two models, the basic model including all essential equipment and accessories for efficient service.



In 30 seconds



on the SHEAR SPEED

Cutting all teeth simultaneously, the Michigan Shear Speed will produce semi-finished helical gears, spur gears or splines as fast as you can finish them on a Michigan shaving machine. The gear shown, a 2¼ inch diameter, 27 tooth helical is currently being cut in 30 seconds each.

For information on the Shear Speed Machine and Process, ask for Bulletin 1843-44

ORIGINATORS of GEAR SHAVING

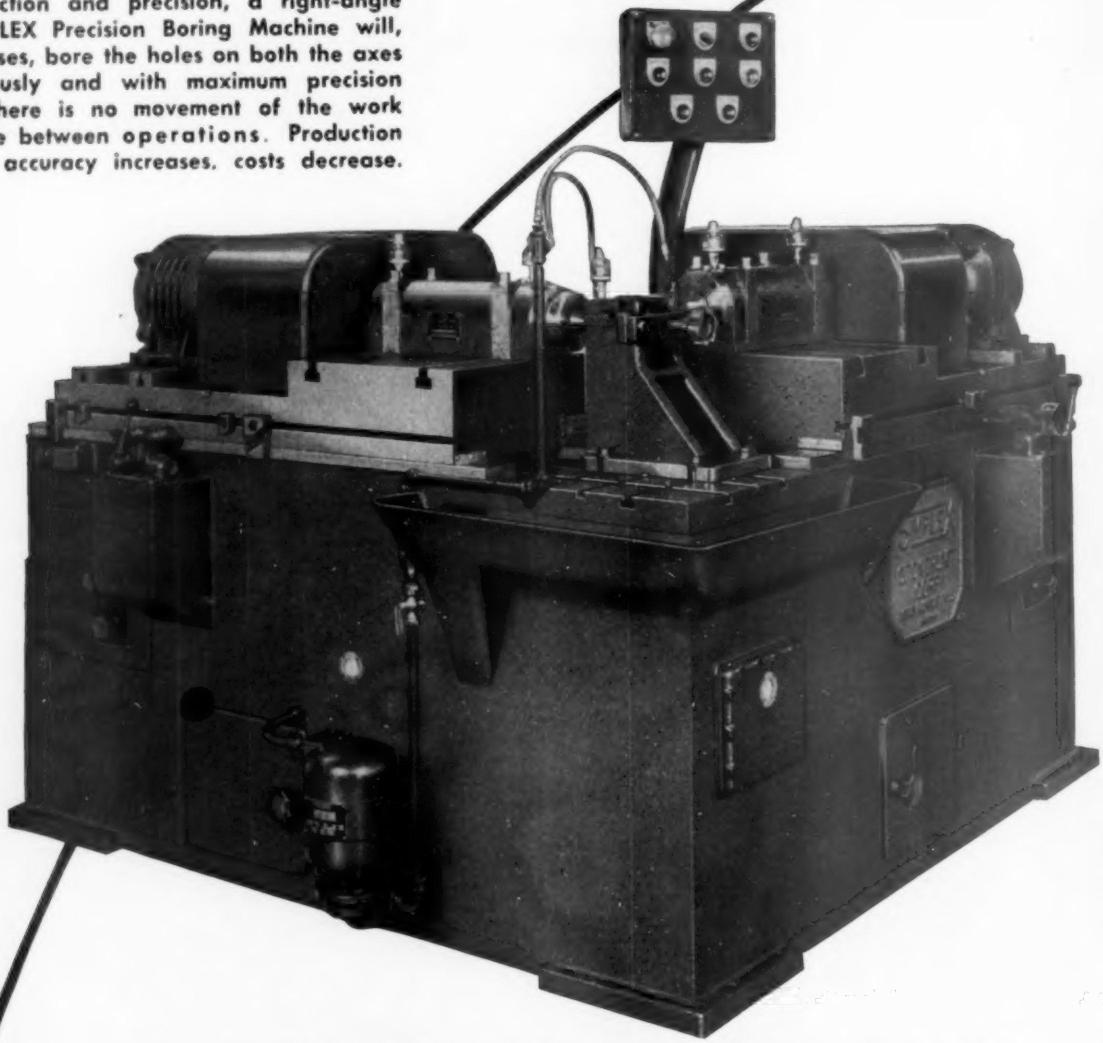
MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD DETROIT 12, U. S. A.

BUY U.S. BONDS STAMPS

SIMPLEX

A common unit in machine construction is a housing having bores at right-angles such as bevel gear housings and worm gear housings. Most methods of machining such parts involve boring the holes on one axis, then indexing and boring the holes on the other axis. This generally involves moving fixture or the tools. For production and precision, a right-angle type SIMPLEX Precision Boring Machine will, in most cases, bore the holes on both the axes simultaneously and with maximum precision because there is no movement of the work and fixture between operations. Production increases, accuracy increases, costs decrease.



The SIMPLEX 2U 2-way Right-angle Precision Boring Machine shown is tooled to bore a die-cast worm gear housing where most tolerances are the order of .0002". The slightest shift in the work or fixture would produce work which would not pass inspection, yet this machine, handled by an unskilled operator, turned out uncounted thousands of units needed by our fighting forces. Similar machines will turn out civilian products of a high quality at the lowest possible cost for those manufacturers who plan their future production today.

Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Precision Boring and Planer Type Milling Machines

4528 West Mitchell Street, Milwaukee 14, Wisconsin


GORTON
SPECIALISTS FOR OVER 50 YEARS IN
Tracer-Controlled
MILLING
Tracer Controlled
PANTOGRAPH
Saves Critical
MAN HOURS
Typical HIGH PRODUCTION JOB
for 1000 HP. Diesel Engines
IRREGULAR PORTS MILLED in ROTARY VALVES . . . in 30 Min. Each
This manufacturer solved the difficulties involved in milling irregular shapes in cylindrical parts by placing the job on a Gorton Tracer-Controlled Pantograph, equipped with a Gorton Roll Attachment, enabling use of only a simple, FLAT Master.
Specifications called for cutting highly finished ports in these Rotary Valves of nickel steel tubing, 7/32″ thick. The required rough, semi-finish and finish cuts were completed in 30 minutes per Valve, Floor-to-Floor Time. Port was first roughed with 3/8″ dia. 4-flute spiral end mill. For the semi-finish operation, tracer and cutter were changed to 1/4″ dia. Finish cut necessitated only a change in tracer style. To prevent chatter marks and insure the fine finish demanded, only .002″ to .003″ of stock was removed in the finishing cut.
GORTON ENGINEERING SERVICE, FREE. Submit your milling problems like these to Gorton Engineers. Use their specialized experience in Tracer-Control Milling to solve your problems—recommendations made without charge or obligation. Send part or print and specifications to your nearest Gorton Dealer, or direct to the Gorton Factory at Racine, Wis.
Gorton Tracer-Controlled Machines simplify difficult operations like this, because they are quickly set up, and easily operated with less skilled labor than by other methods. Tracer-Control assures uniform accuracy. The versatile Gorton Roll Attachment permits milling or engraving of continuous designs, completely around rolls, tubes, etc. For further information, send for both Bulletins offered below.
JOB IN BRIEF . . .
PART—Valve.
OPERATION — Rough, Semi-Finish and Finish Milling of irregular-shaped port in Valves.
MACHINE—Gorton 3-Z Pantograph.
ATTACHMENT—Gorton Roll Attachment 750-1.
CUTTERS— 3/8″ and 1/4″ four-flute, spiral, end mills.
MATERIAL — Nickel Steel tubing, 7/32″ wall thickness.
PRODUCTION—30 minutes per Valve, floor to-floor.
FINISH—Exceptionally smooth.
The Right Size
The Right Type
of Machine
for Every Job . . .
From 2 oz. to 2 ton
DIE BLOCKS
Tracer-Controlled
MILLING
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ETCHING
GORTON Precision MACHINES
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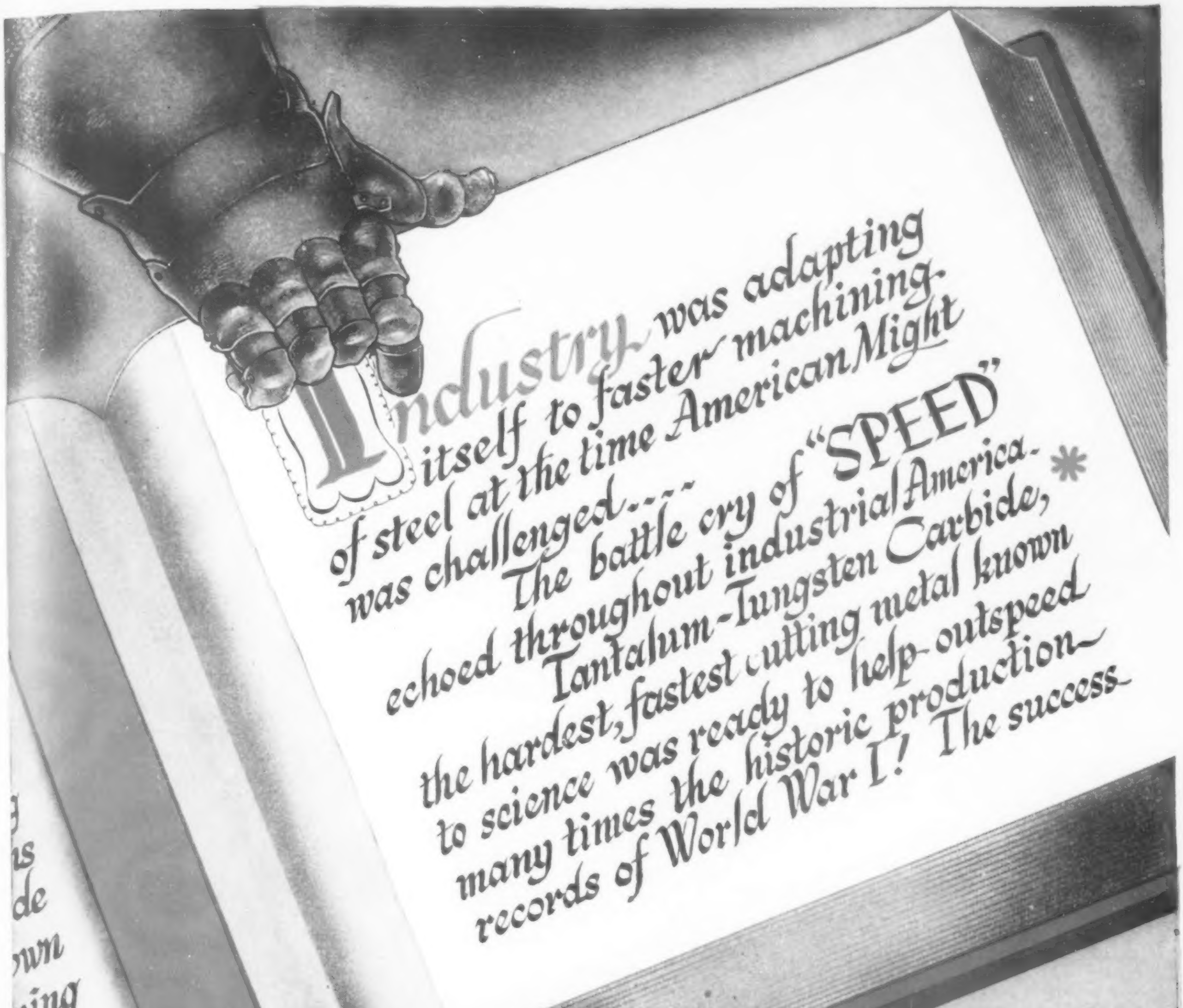
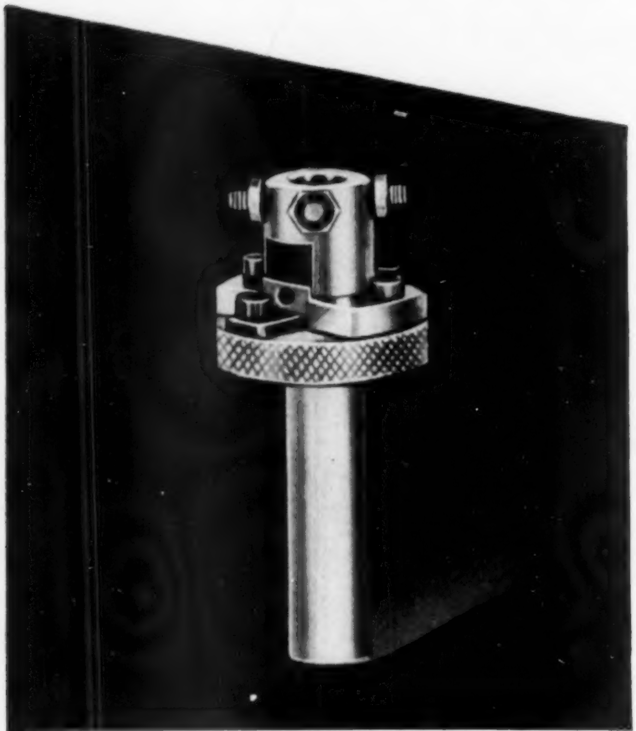


VASCOLOY-RAMET CORPORATION

GENERAL OFFICES: NORTH CHICAGO, ILLINOIS
SALES AND SERVICE IN PRINCIPAL CITIES



A New Precision Holder for Better Reaming

Here is a reamer holder designed and built by reamer specialists, with the one basic idea of bringing to your turret lathes, hand and automatic screw machines, the full precision qualities inherent in L & I Ground Flute Reamers.

The L & I Precision Centering Reamer Holder employs a new design principle. It quickly establishes a new center absolutely true with the spindle axis, and drives the reamer from this dead center. *Reamer does not float* — but follows true centerline free from weight or pressure. No bushings — no bell-mouthing — no tapered holes — corrects diagonal errors in turrets with worn locks.

Standard model holds reamers from 1/16″ to 7/16″ diameter interchangeably. Larger model for reamers 7/16″ to 1⅛″ diameter.

Write for bulletin giving full specifications and prices.

LAVALLEE & IDE, INC. • CHICOPEE, MASS.

L&I GROUND FLUTE REAMERS

CUTTING TOOLS — MACHINE TOOLS — PIONEER PUMPS — PROPER COOLANT

VITAL LINK

Pioneer Pumps form the final link in the machine tool cycle . . . they complete the circle that makes precision production possible.

Designed by engineers who sought long and vainly to solve their own coolant problems with equipment then existing, Pioneer Pumps found immediate acceptance. An acceptance that has mounted steadily as they proved to production men they were indeed better pumps.

Built to rigid standards, Pioneer Pumps provide an ample, flawless flow of coolant . . . they're the longest-lived pumps in existence. And the most adaptable, with 400 standard models insuring the right pump for any application.

PIONEER MODEL "VA"

This model is ideal for submerging in coolant sumps of grinding, honing, lapping, superfinishing and sanding machines—or wherever outside mounting is impossible or objectionable. Internal design, with suction from motor end down, prevents coolant surging up shaft when pump is operated intermittently or when outlet line is throttled.

PIONEER Pumps
HIGH EFFICIENCY • LOW POWER CONSUMPTION
GREATER VOLUME • NO LESS MAINTENANCE

Pioneer Pump & Manufacturing Co.
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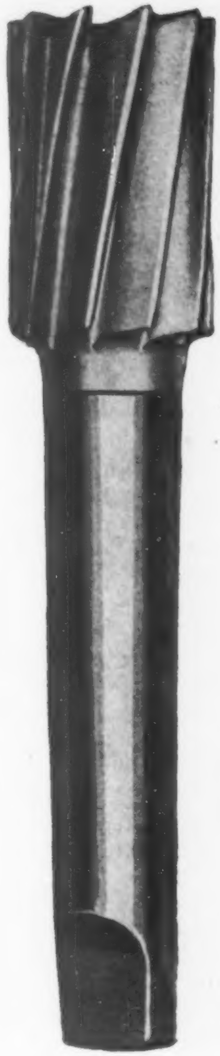
PROTECT

Your Profits!

Production economies are not linked solely to the production of a job. To an even greater degree, economical production is determined by whether your tool room is managed wisely.

On any job that end mills are used, or for that matter any high-speed cutter, it is the number of pieces per grind that really counts. If you can increase the production life of each tool in your shop to give you at least five times the normal production of the original tools, your profits will be greatly increased because your investment in tool costs will have been greatly reduced.



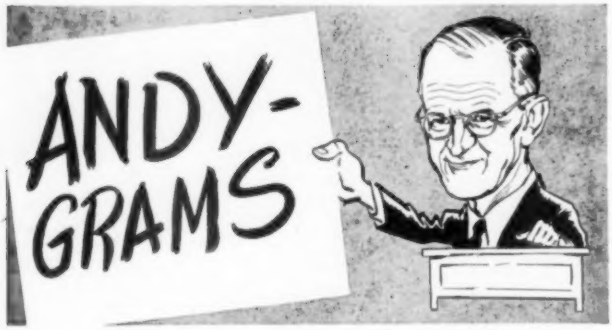
Leading companies from coast to coast are using the Eastern Cutter Tool Engineering Service for economy and efficiency. Our method of recutting, reclaiming and converting tools will help you to PROTECT YOUR PROFITS.

We Specialize in Converting Standard Cutters to Special

OUR NEW CATALOG IS READY. SEND FOR IT TODAY.

EASTERN CUTTER CORPORATION

30-32 LITTLETON AVE. NEWARK 7, NEW JERSEY



T'OTHER DAY, I invited myself out to lunch with Tom Cullen, our associate editor, in the course of which I unwittingly crashed his circle of intimates in the advertising game. Anyway, there was a noticeable tang of printers ink, to which I am slowly becoming inured although I still hanker for the smell of coolants and welder smoke. A chance remark—or was it?—brought up the old time cars, and that started a round of reminiscences dating back to the days when the "horseless carriage" was a rich man's toy and a chauffeur's livery was a uniform of distinction.

How many of you old timers recall the Orion Buckboard, the "stud" cooled Knox, the Marin, Briscoe (you should remember the E.M.F.) and later, the one-eyed Earl and other royalties—the King Rex, Monarch? And others named for all of the heavenly bodies, the fleet among feathered and four legged critters as well as the leading Indian tribes. There were just oodles and oodles of 'em—and the vast majority are a mere memory.

Me, I turned my first trick on an Oldsmobile sidewinder and, up to the time I came to Detroit in '22, had been over and under (mostly under) plenty of the old time cars. Around '06, I worked in the automobile division of the American Locomotive Works, where they built the Alco, American version of the French Berliet. And there was a car!

Later, taking a fling as a garage mechanic—ah, there was romance in automobiles, them days!—I got acquainted with innards of foreign and domestic cars as they came along. The De Dion and Fiat, the Pancard and Renault, the Benz and the Mercedes were prominent among the imports, while the domestics were as numerous as the alphabetical bureaus of government.

~ ~ ~ ~

BY FIXING and swapping, I owned (sometimes only long enough for a trial spin) a Ford Model N, a Locomobile, a Corbin, a Herff-Brooks, a '09 Cadillac (if you lost the shift you started all over again), a Mitchell, a Velie, several Saxon puddle jumpers and a number of others now among the limbo of the forgotten.

Along in '13, I designed and built a light car—the Rylander Moterette, if you please—but, being streamlined, it was too revolutionary for the conservatives of the day. Then, among other things, I was co-inventor of a safety crank, but Boss Kettering came along with his self starter and that was that. All I ever got out of either was the interest on the experience.

THE DECADE from 1910 to '20 was a period of endless experiment in the automotive field, with discouragement and failure on the one hand and the solidifying of industrial empires on the other. The Owen Magnetic made its bow to the public and joined the hosts of the also rans, as did the Speedwell (rotary valve) and the several "gearless" jobs—the Cartercar, the Metz and the Moline. The Knight sleeve valve, used in the Handley, Willys, Falcon, Stearns, Edwards, Moline and Stoddard, made a bid for permanence, but that too made its eventual exit, as did the aristocrat among the air cooled cars, the Franklin, and the steamers and electrics.

They were husky brutes, the old cars—the Peerless, Premier, Pierce-Arrow, American Underslung, National, Winton, Stutz, Mercer, Stevens-Duryea, Locomobile and others, including the Packard, and it took brute strength to crank them on a cold morning. Compression was so high, however, that one could often start them with a flip of the spark lever. Ether was a favorite primer, and some cars were started by injecting acetylene gas into the cylinders. Personally, I've seen more than one cylinder head go blooey from an overdose of acetylene or ether. One never knew!

The overhead valve had its adherents in the Olds "4", Chalmers "40", Moon, Oakland, Scripps-Booth, Durant, Buick and Chevrolet. It is still retained in the latter two, and in the Nash which, in the course of its evolution, had in turn been the Rambler and Jeffery. To the best of my recollection, the Chevy started out as the Little.

There were the Sibilant Sixes, inspired by Hudson, and the euphonic and alliterative Eights, the "sewing machine" group (Singer, Davis and White) and the "assembled" jobs—the Case, Columbia, Liberty, Westcott, Velie and others—the most using Continental engines. There was the Hollier Six; styled after the Rolls-Royce, the Knox "Cubist," the Jordan Bluebird and the Overland Redbird although, when it came to style, the Paige—later to become the Graham—led the field for several years.

~ ~ ~ ~

A NUMBER of the makers built companion cars as, for example, Chandler built the Cleveland, Moon the Diana, Mercer the Templar, Oldsmobile the Viking, Buick the Marquette, Graham-Paige the Jewett, Oakland the Pontiac, Studebaker the Erkskine, Hudson the Essex, Nash the Lafayette and so on and on. The Chalmers and the "Good Maxwell" evolved into the Chrysler, but as for the great majority, they molder among a thousand buried hopes. The old line companies—Ford, General Motors, Packard, Willys, Studebaker, Nash, and the more recent among the giants—Chrysler—now dominate the automotive field.

Although hailed as new, many of the modern "features" had their genesis in the old days. The Brush had independent coil springs at the turn of the century, the Wichita had steering column "gear shift" back in '11, when Pierce-Arrow had lamps on the fenders, and Atwater-Kent came through with automatic timing along in '13. Modern flow lines were visualized decades ago, but, it took modern techniques and supercolossal tools to realize the vision.

COMING BACK to Tom Cullen, he is an old timer in the automotive game and knows about everybody from "way back when." On the *Tool Engineer,* he functions (to use our language) as a tool checker. That is, he picks the bugs out of copy and embellishes it with these here hieroglyphics that, somehow, make sense to the printers. Unfortunately, the inevitable typographical error will creep in, especially exasperating when names are misspelled. Like calling Harry Gotberg Herman in the June issue.

Reminds me of the time when, playing football, I had accidentally done a "Wrong Way Corrigan" or something that, with the usual luck of a Swede, turned out okay. Anyway, I got my pic in the papers, and there I was, with a mop of hair—oh, I had it once!—and all togged out in armored pants, shin guards, turtle neck sweater 'n everything. Quite the gridiron hero! And right below, the caption: The great *Orlando.* My one and only bid to fame, and muffed by a typographical error!

Andy

GADGETS

Ingenious Devices and Ideas to Help the Tool Engineer in His Daily Work

Chuck Jaw Grinding Fixture

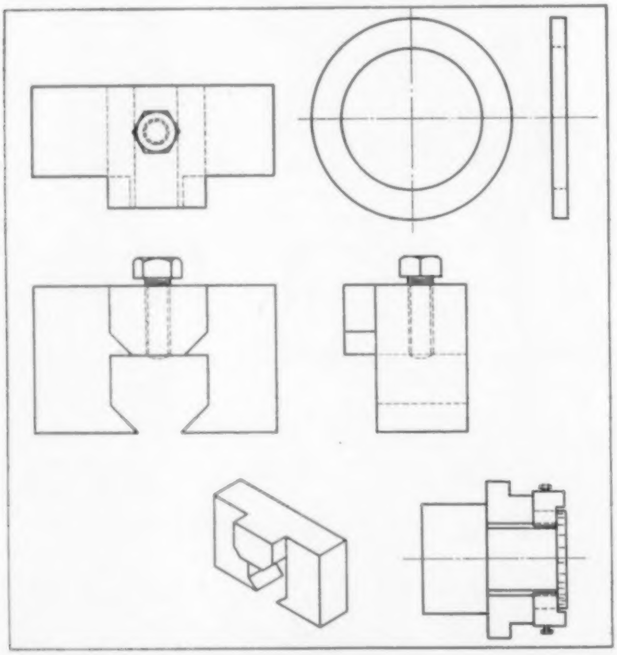
THE REGRINDING of universal-chuck jaws in the lathe when they have become worn and no longer run true has always been a haphazard and unsatisfactory process. After a careful study, the fixture set-up illustrated in the attached drawing was devised and proved a complete success. It can be installed in a very few minutes, the jaws ground, and the fixture removed just as speedily. As important, perhaps, is the fact that the bearing surfaces of the jaws are ground geometrically concentric with the axis of the lathe.

The set-up consists of three "false jaws" which are machined to slip over the regular chuck jaws and locked in position by set-screws, as illustrated at B in the sketch. These, in turn, bear down on the ring C, thus eliminating all backlash in the scroll and gears of the chuck, and also all axial play of the chuck jaws in their T. slots.

Most work checked with the indicator after regrinding by this process shows no more than a .001" run-out. And this can be traced to wear in the scroll or gears, and to accumulated tolerance errors in the moving parts of the chuck.

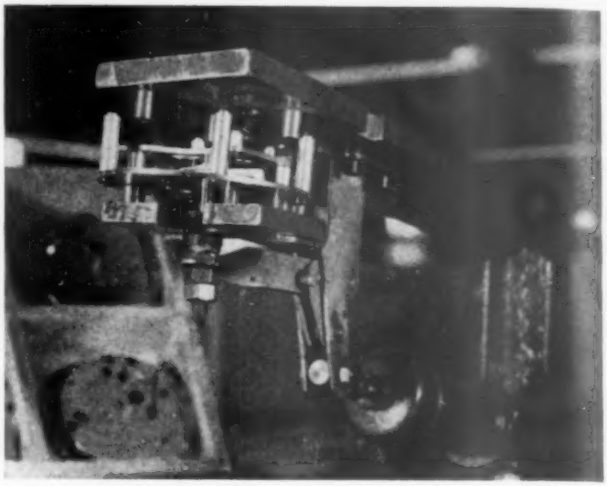
Since judgment errors are completely eliminated, relatively unskilled help can do a satisfactory grinding job by the use of this device and it can be employed on all chucks of the same make and size in the shop.

S/Sgt. Joseph R. E. Paquin,
Armed Forces. (A.S.T.E. Member).



Pneumatic Clamp Cuts Costs

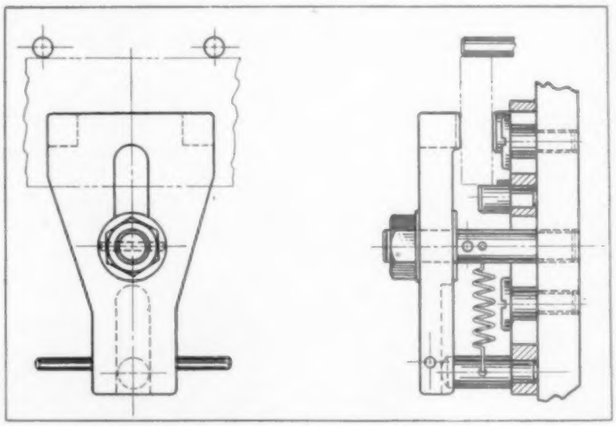
THE "GADGET" SHOWN in the photograph speeded up a slow operation in clock mechanism sub-assembly by some 43 per cent. In addition, it greatly improved quality. The assembly in question, which becomes a housing for two gear units, consists of two plates fastened to spacing pillars with three screws.



Because it was difficult to control the flatness of the plates, due to the punishment inflicted by several machining operations, the units had to be recurrently demounted and adjusted for gear thrust. This was a costly procedure; besides, the plates were often badly marred, and therefore rendered useless, as a result of slipping screw drivers.

With the improved method, the unit is loosely assembled into a locating nest within the clamp assembly. The clamp, of toggle type, is actuated by a pneumatic cylinder controlled by a 2-way foot valve. Pressure on the clock plates is regulated by adjusting the toggles. After inspection, the operator releases the clamp and removes the unit, with uniform results.

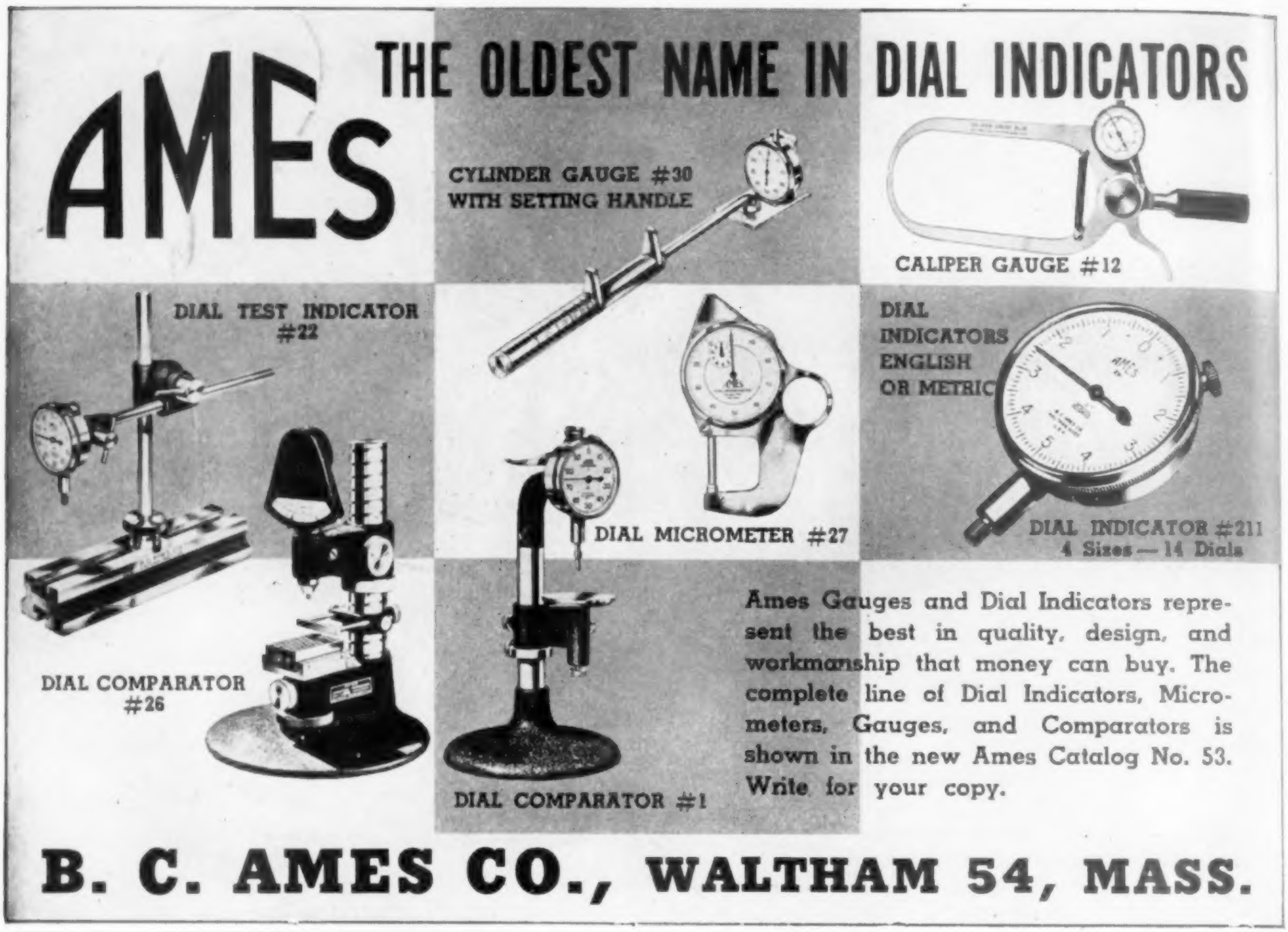
A. J. Leone, Chelsea, Mass.



Two-In-One Clamp

DESIGNED FOR a drill jig 2-in-1 clamp shown has boosted production 50 to 75%. A spring holds the clamp, which is slopped, over the work, when it can be tightened with the nut shown, or with a hand knob. Retraction of the clamp, to release the workpiece, is effected by the pull pin shown. The drawing is so clear that detailed explanation is unnecessary; sufficient to say that the idea can be widely applied. Not only to drill jigs but to other fixtures.

Frank J. Peragine,
New York, N. Y.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THE OLDEST NAME IN DIAL INDICATORS
CYLINDER GAUGE #30 WITH SETTING HANDLE
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DIAL INDICATORS ENGLISH OR METRIC
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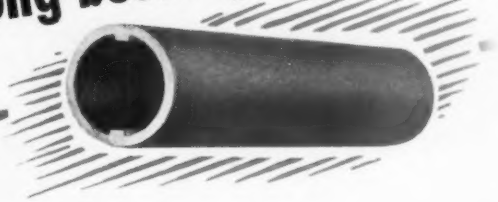
Ames Gauges and Dial Indicators represent the best in quality, design, and workmanship that money can buy. The complete line of Dial Indicators, Micrometers, Gauges, and Comparators is shown in the new Ames Catalog No. 53. Write for your copy.
B. C. AMES CO., WALTHAM 54, MASS.


NOW... YOU CAN USE SHORT PIECES OF SCRAP TOOL BITS AS REPLACEMENT CUTTERS
Insert in bar.
Complete cutter bar and insert showing cutting edge.
The micrometer dial of the insert has 25 graduations, each being one-thousandths of an inch.
Write at once for complete descriptive bulletins.
Quick, enthusiastic acceptance was received for this new time and money-saving boring-bar insert. It has many advantages found in no other insert.
NASH-ZEMPEL
BORING-BAR INSERT
It is unnecessary for you to come to us for cutter replacements. Cutters can be made in your own shop from scrap bits of hi-speed steel. No special tools necessary. Only a simple grinding operation required.
The insert can be installed in any bar available by a simple boring and milling operation. The locating head of the boring-bar insert fits snugly into the recessed slot of the bar. The set screw in the boring bar locates the insert and draws the head firmly against the shoulder of the recessed slot in the bar. Accurate location point is always maintained. The Nash-Zempel boring-bar insert is available in forty standard sizes, with special sizes on request.
NASH-ZEMPEL TOOLS
Division of J. M. Nash Company
2354 NORTH 30TH STREET • MILWAUKEE 10, WISCONSIN

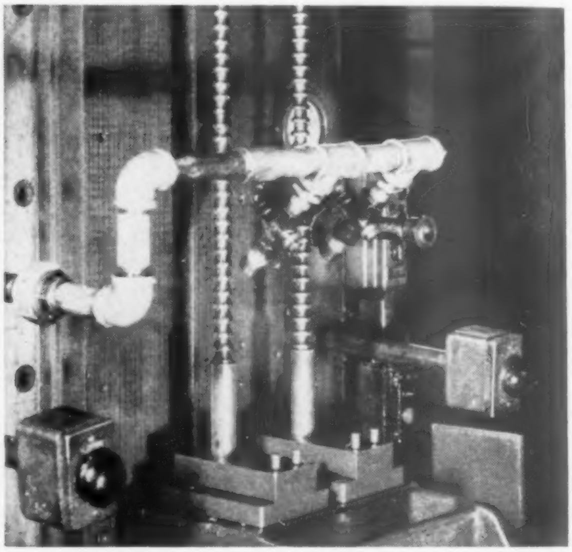
4 machines broach 8000 7 inch long bushings per day



"An outstanding example of tool engineering."

The above editorial comment is from a leading tool journal in referring to this tough tank track pin bushings assignment.

The need was urgent. Quota called for 8000 bushings per day. U. S. Broach engineers went to work and designed necessary broaches and fixtures so that the hoped for output of 8000 bushings per day was not only easily attained, but greatly exceeded.



These 7 inch long tank track pin bushings (material was heat treated seamless steel tubing at 38 Rockwell C) were to be internally broached with two inverted keys running the full length of the bushing.

No machines of the type desired to do this job were available. Therefore, four standard slab, single-ram broaching machines with 66" stroke, were converted to special pull-down machines.

It was important in this conversion job, that the retrievers would prove dependable in the hands of unskilled operators as it was necessary to employ totally inexperienced girls. As originally planned, the job was designed for three passes, to complete broaching the inside diameter of the two inverted splines, but careful study made it possible to complete the job in two passes.

Two bushings were placed in the fixture, when the upper ram pushed the broaches down through the work-pieces until gripped by the broach puller, below. The cutting stroke was then completed and the work removed. Then the main ram ascended to a definite stop. The broaches were then picked up by the retriever, above, and raised high enough so that the succeeding parts could be inserted into the fixture. The cycle then repeated.

The broach retriever was hydraulically operated and the relay and stop switches had to be coordinated so that, by pressing a button, the entire operation was automatically performed.

It proved so completely successful that the machines were operated day and night until the job was completed.

Write today for your copy of U. S. Broach booklet of helpful information.

U.S. BROACH Company

USB — 6468 E. SEVEN MILE RD. — DETROIT 12, MICH. — BROACHING TOOLS

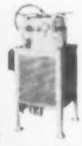
TELEPHONE TWINBROOK 1-2211

SPECIFY *Hilco*

FOR LUBRICATING, FUEL AND INDUSTRIAL OIL PURIFYING

HILCO OIL RECLAIMERS

A simple, economical and fool-proof method of restoring contaminated oil to new oil condition – removes water and fuel dilution – continuous or intermittent operation.

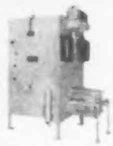


HILCO-HYFLOW OIL FILTERS

A superior oil filter for perfect filtering of lubricating, industrial and fuel oil – for continuous or intermittent operation

HILCO AIRLINE OIL FILTERS

A perfect method for contact oil purifying complete re-refining to new oil values – removes fuel dilution and water. For continuous or intermittent batching from system or tanks



HILCO units use Hilite for purifying mineral oils –*Hiltex or *Adstay for perfect filtering or additive and detergent oils. The HILCO line offers you a complete lubricating, fuel and industrial oil purifier service – Write today for free literature – let us help you take care of "That Particular Job."

* These items are available to present HILCO users who have changed over to the use of compounded oils.

THE HILLIARD CORPORATION
107 West Fourth St. Elmira, New York

SIMPLICITY . . . EASE OF CHANGE
From Internal to External Makes

PARKER-MAJESTIC

LEADER IN THE GRINDING FIELD

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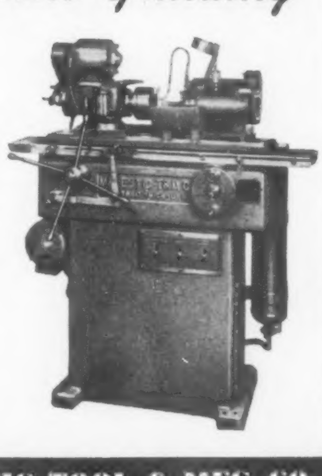
For Precision Grinding

Features . . .

- HAND OR POWER FEED . . . .
- DEAD AND LIVE CENTER DRIVE . . . .
- OSCILLATING TABLE ACTION . . . .
- COOLANT FILTERING . . . . . .

Send for Descriptive Circular

Representatives in All Principal Cities



pm **MAJESTIC TOOL & MFG. CO.**
147 JOS. CAMPAU • DETROIT 7, MICHIGAN

RED-E-TOOLS

SAVE MONEY . . .
SPEED PRODUCTION . . .
SAFEGUARD PRECISION!

Improved . . . Balanced

CAM ACTION GRINDER DOG

"The dog without a bite"

If you are seeking increased production, this dog can be an important factor. It is easy to adjust, with instant positive holding action . . . yet may be used safely on precision finished work without danger of marring, because the cam face is ground smooth both as to surface and contour, thus reducing spoilage and rejects.

An excellent dog for all types of grinders and especially for semi-automatic machines, because once adjusted for size, all that is necessary in setting up work is to simply release the cam. The harder the drive, the tighter it grips.

Available in four sizes to take work from ¼" to 2" diameter. Made entirely of steel with ground finish. Send for Grinder Dog Bulletin E-45

THE READY TOOL COMPANY
IRANISTAN & R. R. AVENUES
BRIDGEPORT, CONNECTICUT

OTHER RED-E PRODUCTS YOU SHOULD KNOW . . .

- CEMENTED CARBIDE TIPPED LATHE & GRINDER CENTERS with the RED-E Safety "Life Line"
- HIGH SPEED STEEL CENTERS
- RED-E NEW DEPARTURE BALL BEARING CENTERS
- RED-E STYLE X LATHE TOOL with the Tool Steel Bearing
- MILLING MACHINE & FACE PLATE DOGS
- GRINDER DOGS

Bulletins on any or all of these Products on request. RED-E-TOOLS

For CLAMPING PARTS of Varying Thicknesses

Don't waste time making manual adjustments; thickness variations up to ¼-inch are taken care of automatically when your clamp is fitted with a

Pressure-Matic Assembly

By means of a heavy compression die spring, the hold-down spindle automatically adjusts itself to the thickness of work or part being held, maintaining positive pressure. Assembly is welded to work bar. Types for medium and heavy duty De-Sta-Co Clamps.

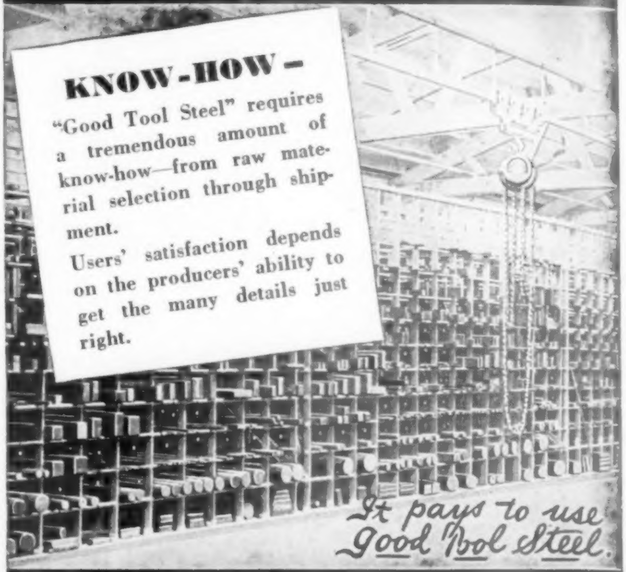
Described in De - Sta - Co Clamp Catalog No. 45. Send for a Copy.

DETROIT STAMPING CO.

Established Over 30 Years

328 Midland Ave • Detroit 3, Mich.

Columbia TOOL STEEL

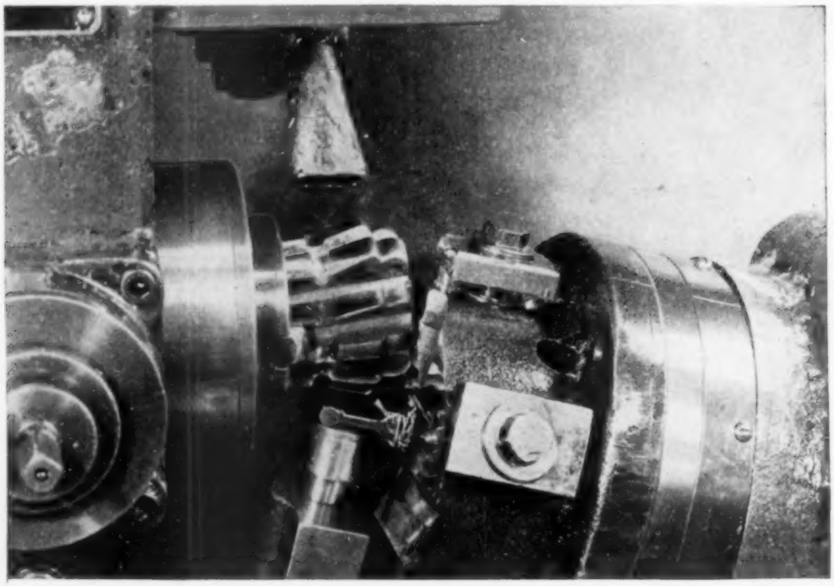


COLUMBIA TOOL STEEL COMPANY

ARTHUR T. CLARAGE, PRESIDENT

MAIN OFFICE AND WORKS

520 EAST 14TH. STREET • CHICAGO HEIGHTS, ILL.



Manufacturing Turbochargers at the American Locomotive Company

From Blueprint to Product

Among the important operations of the American Locomotive Company is the manufacture of turbochargers which are playing a vital part in our war effort. The accompanying picture shows the high speed ground form relieved milling cutters manufactured by National Tool Company milling turbocharger blades which are made of KA-SNO or Type 316 Stainless Steel Forgings. The maximum Brinell hardness is 207.

This operation is performed on a No. 2 Electromil with a feed per minute of 1.9". The cutter is removing approximately .020" stock. The machine is operating at 105 R.P.M. and the cutter completes 150 pieces before requiring regrinding.

The development of the cutter for this job is the result of co-operation between the American Locomotive Company and the Engineering and Metallurgical Departments of National Tool Company. Similar problems involving other milling operations are welcomed for consideration by our Engineering Department.

NATIONAL TOOL PRODUCTS

BROACHES • HERRINGBONE CUTTERS
SLITTING SAWS • COUNTERBORES
REAMERS • GEAR SHAPER CUTTERS
GEAR CUTTERS • MILLING CUTTERS
CIRCULAR AND FLAT FORM TOOLS
HOBS, GROUND AND UNGROUND

National Tools are the Shapers of Progress

ARMY E NAVY

NATIONAL TOOL Co.

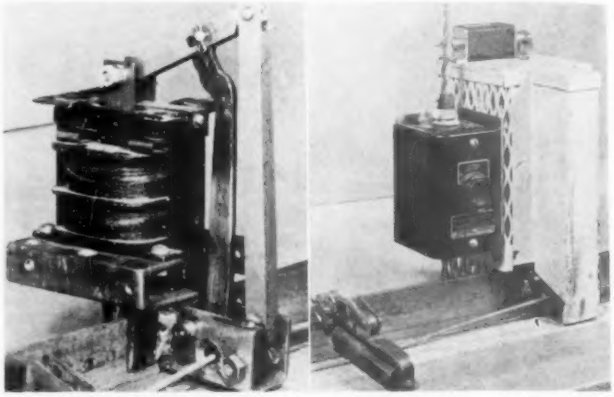
11200 MADISON AVENUE CLEVELAND, OHIO

Electric Cable Cutter

Designed and developed at General Electric's Pittsfield Works, an electric cable cutter is used to reduce the time ordinarily required to cut wire for control panel assemblies. Easy to construct, the unit consists of a push button operated, 110 volt solenoid, a cutter enclosed in a housing for mechanical and electrical safety, and a tension roller which prevents the cable from slipping or buckling while being cut. The device is mounted on a bench provided with a scale for easy measuring of the cable.

The photo at left shows the complete assembly, with housing in place. At right with cover removed to show method of mounting solenoid and levers. As readily seen, the solenoid actuates the levers which in turn, operate the cutters. The tension roller and the cutting unit are not rigidly connected, rather, are mounted on a slotted angular bracket which runs the entire length of the scale.

This arrangement permits varying the distance between roller and cutter, or of eliminating the use of the roller entirely, to accommodate wire of different stiffness. The device is easily positioned by the operator and is locked by means of a thumb screw on the roller.



This method is faster, and more accurate, than the conventional method of cutting wire with pliers, when the operator has to draw the wire along the scale until the stop is reached, then clamp the wire to hold it in position and walk back to cut it at the proper point. The new method consists of threading the cable through the cutting hole and under the roller, drawing it to the desired length on the scale, and pressing the control button which is mounted on the cable cutter. However the operating switch may be positioned anywhere on the scale by installing it at the end of a flexible lead.

* *This is a "Know-How" item passed along by General Electric, not a commercial product. However, it's handy, may be variously adapted, and any one is free to make it.*

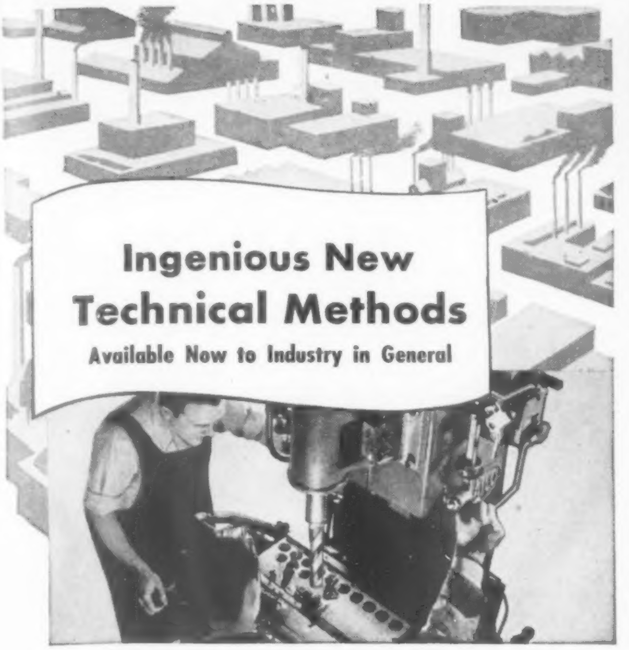
Correction

With regard to the article—"Carbide Cutters—Their Application and Selection,"—which appeared in the June *Tool Engineer,* we are apprised of an error in listing the Vascoloy-Ramet grades.

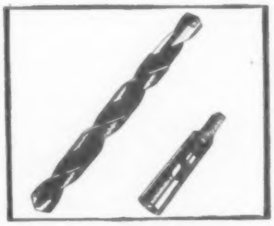
In chart "A," under roughing cuts, reading from left to right, the V-R grades were listed as EM, EE and XX. The correct listing is EM, EM and EE. On the finishing cuts, the grades were listed as X, EM and E. The correct listing is E, EM and EM.

In chart "B," on rough castings, the V-R grades should be listed as 2A5, 2A68 and 2A68, from left to right. And on aluminum alloys, the grades should be 2A5, 2A5 and 2A68. On brass and bronze, the listings should read 2A7, 2A7 and 2A5.

Readers who wish to use these charts for future comparison of carbide tool grades may note these corrections.



New Shankless Roll-Forged Drill is Faster, Tougher, More Economical



Shankless Drill and "Drill Driver"

Developed by Ford for wartime uses—available now to industry in general. "More holes at less cost," is the claim for this ingenious new Shankless high speed drill—made in two parts—the drill itself, and a removable taper shank, known as the "drill driver." By this separation, costs to the user have been cut 20% to 30% under conventional taper-shank drills. In the conventional drill, the shank must be discarded when the point and flutes are worn out. Here, however, the drill driver is used throughout the lives of many drills. Shankless drills are roll-forged and twisted, unlike the machined manufacture of ordinary drills, for improved structure.

Principal advantages are (1) Lower first cost. (2) Greater hole production because of greater strength. (3) Reduced breakage with tough "shock-absorber" neck. (4) Greater length of usable flute. (5) Greater scrap recovery value of unused portion of drill.

Wartime advantages of Wrigley's Spearmint Gum show how this quality product, too, can help industry—once it again becomes available. In the meantime, no Wrigley's Spearmint Gum is being made; and none will be made, until conditions permit its manufacture in quality and quantity for everyone. That is why we ask you to "remember the Wrigley's Spearmint wrapper," as the symbol of top quality and flavor—*that will be back!*

Remember this wrapper

You can get complete information from
Republic Drill & Tool Co.
322 S. Green St., Chicago 7, Ill.

2-79

Introducing –

KENNAMETAL "HD" TOOLS

WITH CLAMPED-IN, ADVANCEABLE KENNAMETAL TIPS

STYLE 12 HD (OPPOSITE HAND-STYLE 11 HD)

"HD" TIPS ARE STRONG
Tip is firmly supported — underside is diamond ground, and rests on plane surface of recess which is finished true with Kennametal Milling Cutter or End File. Thermally strain-free assembly also helps prevent tip breakage.

TIP WHEN NEW

AFTER MANY REGRINDS

MAJOR PART OF TIP USED
When dull, tip can be advanced, and resharpened time and again, until the major part of it has been used.

ECONOMICAL REGRINDING
Only the tip is reground —no shank steel is removed. Operation is fast —clogging of diamond wheel grinder with steel is prevented.

STREAMLINED DESIGN
Smooth, unimpeded chip flow assured by improved clamping arrangement, correctly positioned. HD design employs pressures set up in cutting as factors to help hold tip in place.

ONE SHANK SERVES FOR THE LIFE OF MANY TIPS

FEWER TOOLS REQUIRED
Many tips can be used during the life of a shank, and tip of suitable Kennametal composition can be used for each job.

for HEAVY-DUTY Machining on Steel and Cast Iron

Kennametal HD Clamped-On Tools make practicable high rate carbide machining on heavy steel forgings, castings, and bar stock, and cast iron, because the strength of the special HD tips and the perfected design of the tool enable deep cuts and heavy feeds to be taken at intermediate speeds, with amazing tool life.

HD Tools are now available in two styles—11HD and 12HD —for heavy duty turning and boring operations, with special HD tips in Grade KM for general steel cutting, Grade K2S for machining very rough or scaly steel castings, and Grade K6 for cutting cast iron. Larger sizes, i.e., with shanks 1" to 2" wide, are now being produced.

Catalog information, and prices, will be sent immediately upon request.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL Inc., LATROBE, PA.

TOOLS E PRECISION MADE

CONOMY DRILL JIG BUSHINGS and GAGES

will promote greater efficiency and accuracy in your present and post-war production standards.

UNDERSIZE GAGES restored to active service, at a minimum cost, by hard chrome plating and refinishing to original sizes.

Write today for particulars

ECONOMY TOOL & MACHINE CO.
MILWAUKEE 14, WISCONSIN

Step up 2-STEP DRILLING!

USE SUBLAND OIL-HOLE DRILLS!

Straight Shank

Morse Taper Shank

By drilling two steps in a single operation, Subland Oil-Hole Drills make an appreciable saving in production time, as compared with ordinary drills.

But Subland Oil-Hole Drills save time in still another way! Because of a constant stream of oil at each of the cutting edges, they permit much faster drilling than with ordinary subland drills.

A two-fold time saving! No wonder more and more shops are turning to Subland Oil-Hole Drills as the solution of the problem of high drilling costs!

All sizes from ½" to 3½" in diameter and up to 36" overall. Please specify taper or straight shank. We also specialize in the manufacture of all types of subland drills and reamers.

Write for QUOTATION

DETROIT REAMER & TOOL CO.
2830 E. 7-Mile Road Detroit 12, Mich.

Manufacturers of Oil-Hole Drills, Special Reamers, Circularity Relieved Reamers, End Mills and Special Tools.

GOOD READING

A Guide to Significant Books and Articles of Interest in the Trade Press

UNDERSTANDING RADIO is title of a book by Herbert M. Watson, Herbert E. Welch, associate professor of Radio Technology and Engineering, and George S. Eby, professor, Applied Science, Stockton Junior College. The book covers the radio field for the newcomer, who gains confidence as he deals with sets and circuits and the radio principles involved in their operation. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18,. Also published by McGraw-Hill, **MANAGEMENT AT THE BARGAINING TABLE,** by Lee H. Hill and Charles R. Hook, Jr., covers a full discussion of all the points of difference that arises in negotiations, and gives practical pointers on preparing for and carrying on negotiations.

THE TOOL AND DIE INDUSTRY UNITES is title of a booklet, issued by the National Tool and Die Manufacturers Assn., which outlines the NTDMA'S program of activities. The booklet should be of special interest to many A.S.T.Eers who are engaged in the manufacture of tools and dies.

GENERAL ELECTRIC ANNOUNCES ELECTRONICS TRAINING COURSE. While not essentially *"good reading,"* a talking slide film training course in *Industrial Electronics* must nevertheless be considered to be of high educational value. Carefully organized for presentation in 12 sessions, the new course is expected to have wide use throughout industry wherever knowledge of equipment is desired or applied.

Presented throughout in a clear, non-technical manner, the course consists of 12 talking slide films, each about 30 minutes in length, 25 copies of each of twelve lecture review booklets keyed to the slide films, an instructor's manual covering the presentation of all 12 lectures, and an attractive, sturdy carrying case designed to accommodate the complete course.

Complete information may be had from the General Electric Company's Technical Press Service, Schenectady, N.Y.

CASTING METAL WITH THE ELECTRIC ARC is title of an article by W. R. Coffin in July *Modern Machine Shop.* While frankly stated that the quality of the art is not as good as that produced by gas cutting, it can nevertheless be advantageously used in many cases where small shops lack the necessary gas cutting equipment.

BENDING, an article by Wm. C. Tucker in July *Machine Tool Blue Book,* treats the bending of formed strips, sheets, tubing, pipe and miscellaneous shapes in a well considered and illustrated article.

TAMING LIGHTNING—NATURE'S OUTLAW, an article in August *Science and Mechanics,* gives an interesting outline of the freaks of lightning and the attempts by man to control a force which has been known to attain a volume of current of 160,000 amperes, 15,000,000 volts and momentary energy of 2,500,000,000 kilowatts.

STANDARDIZATION OF SHACKLES, an article in July 12, *Iron Age,* offers a discussion on drop forged shackle quality which should be of vital interest to all users of wire rope slings, and especially to safety engineers. The article presents the case for a national standard of shackles, eyes, hooks and other drop forged accessories used in hoisting.

PARTS OF LAMINATED PLASTIC SHEETS FORMED BY THERMOELASTIC METHODS, by Robert L. Whann in July 5 *American Machinist.* The article deals with a simple, hot working technique in forming laminated plastic sheet that produces airplane parts that are lighter in weight and often less costly than those made of metal.

COLD IMPACT EXTRUSION OF ALUMINUM PARTS FOR DOUGLAS AIRCRAFT. An article by J. R. Boston in July *Machinery.* An excellent treatise, well illustrated, on the tools and techniques used with impact extrusion of light aircraft parts. The methods shown have wide application in parts manufactured in various industries.

EFFECTS OF PRESSURE AND TEMPERATURE ON IRON POWDER COMPACTS, by Chas. O. Heath, Jr., instructor, and Jos. D. Stetkewicz, associate professor, Dept. of Mechanical Engineering, Rutgers University in July *Metal Progress.* An article dealing with the properties and analysis of powders used in powder metallurgy and the effects of pressure in parts fabrication.

HOW ODOGRAPH PLOTS MAPS AUTOMATICALLY, an article by J. D. Faustman, Capt., Corps of Engineers, The Engineering Board, Ft. Belvoir, Va., in July *Machine Design.* A highly technical and involved treatise on the development and, later, mass production of a "mechanical" brain that, in its design, all but approaches the ultimate in human ingenuity.

A new list of all **AMERICAN STANDARDS and WAR STANDARDS,** approved to date, has just been released by the *American Standards Association.* There are approximately 800 standards listed in the booklet, covering specifications for materials, methods of tests, dimensions, definitions of technical terms, procedures, etc. in the electrical, building, transportation, textile and other fields. The booklet is available free of charge from the ASA, 70 East Forty-fifth Street, New York 17, N.Y.

RESEARCH—AN IRRESISTIBLE FORCE is a pamphlet outlining a talk by Dr. Howard E. Fritz, Director of Research, the *B. F. Goodrich Company,* before the recent Annual Conference of the American Welding Society. The thoughts expressed are inspiring, and may be epitomized in the comment that "there is no such thing as mass production of creative thinking."

PETROLEUM'S MAGIC TOWERS and PETROLEUM HORIZONS, addresses by Wm. R. Boyd, Jr., and Ralph K. Davies delivered at the 4th Wartime Conference of the American Petroleum Institute's Pacific Coast District, gives interesting sidelights on the part petroleum and petroleum products have played in World War II.

Bulletins And Trade Literature

Items briefed herein have been carefully selected for their interest and application. Unless otherwise stated, all are available, free, from the stated sources.

SOUTH BEND LATHE WORKS, 417 E. Madison St., South Bend, Ind., has put out an attractively color-illustrated catalog—9-G—describing the S-B 9 inch *Engine* and *Tool Room Lathes* and the 9 inch *Precision Turret Lathe* with ½" collet capacity.

~ ~ ~ ~

DOUGLAS MACHINE COMPANY, 150 Broadway, New York, N.Y., has published a booklet—"Straight to the Point"—describing *Rotarex Precision Tapping Attachment* for equipping the regular model drill press for controlled lead screw tapping.

~ ~ ~ ~

FIRTH-STERLING STEEL COMPANY, McKeesport, Pa., has issued a series of serio-comic cartoons to impress machine tool operators with the importance of proper handling and care of *carbide tools.*

~ ~ ~ ~

COLONIAL TOOL COMPANY, Ltd., Windsor, Ont., has available an illustrated booklet—D-45—describing the Colonial line of *form tools* and *relieved cutters* and giving information regarding their finishing and sharpening.

~ ~ ~ ~

A 20 page Reference Data Bulletin—PMC 45—by the PERMOLD COMPANY, Medina, Ohio, provides designing engineers, production executives and metallurgists with reliable information on *permanent mold castings.* Various applications are illustrated, along with suggestions for design of parts for this process.

~ ~ ~ ~

"Millionths of an inch for sale by Vinco" is title of a beautifully illustrated booklet by VINCO CORPORATION, 8855 Schaefer, Detroit 27, describing the line of Vinco *gages and masters.*

~ ~ ~ ~

J. L. LUCAS & SON, Bridgeport 5, Conn., has issued a bulletin describing the procedures of *rebuilding machine tools* at the Lucas plant.

~ ~ ~ ~

COLUMBIA TOOL STEEL COMPANY, Chicago Heights, Ill., has put out a 127 page catalogue that, in addition to listing and classifiying *tool steel grades* as to type and approximate composition, is replete with useful charts and technical information.

~ ~ ~ ~

LAPOINTE MACHINE TOOL COMPANY, Hudson, Mass., now has available additional copies of the *Lapointe Broaching Book.*

~ ~ ~ ~

A new 136 page Catalog, by J. H. WILLIAMS & CO., Buffalo 7, N.Y., covers the entire line of Williams wrenches, lathe tools, dogs, clamps and other *drop forged tools* and accessories.

~ ~ ~ ~

NATIONAL AUTOMATIC TOOL COMPANY, Inc., 720 S. N St., Richmond, Ind., has issued a booklet on *Natco Holeway Machines* which, in additional to excellent illustrations, is unique in that it tells what the machines do rather than what they are.

~ ~ ~ ~

The new "Standard" *Welding Positioner,* universal, accessible and of unusually clean design, is fully described in a Bulletin issued by STANDARD MACHINERY COMPANY, Providence 7, R.I.

THE SHEFFIELD CORPORATION, Dayton 1, Ohio, offers an attractive new catalog illustrating and describing the *Sheffield Visual Gages.*

~ ~ ~ ~

POLAN INDUSTRIES, Huntington 19, West Va., put out a Bulletin describing the Polan *Microscopes* for industrial use.

~ ~ ~ ~

CHAIN BELT COMPANY, Milwaukee 1, Wis., has issued buletins—Nos. 460 and 461—on its corrosion resistant *Z-Metal* chain belts and the *Rex Table Top* chain, both widely applicable to materials handling.

Sundstrand Oil Power Transmission for Variable Speeds is described and illustrated in a new Bulletin by SUNDSTRAND MACHINE TOOL CO., Rockford, Ill.

~ ~ ~ ~

Abrasive Segments Used in Chucks, '45 edition, by NORTON COMPANY, Worcestor 6, Mass., describes the mounting of abrasive segments by various manufacturers of abrasive segment holding devices.

~ ~ ~ ~

Its line of hand and machine *Marking Devices,* designed to cover virtually all stamping and identification operations in modern manufacturing plants, is featured in a new 8-page catalog issued by NEW METHOD STEEL STAMPS, INC., 147 Joseph Campau St., Detroit 11, Michigan.

~ ~ ~ ~

A new Bulletin—SC-124—on *Dry Cyaniding,* as carried out in S.C.C. continuous furnaces, has just been issued by SURFACE COMBUSTION CO., Toledo 1, Ohio.

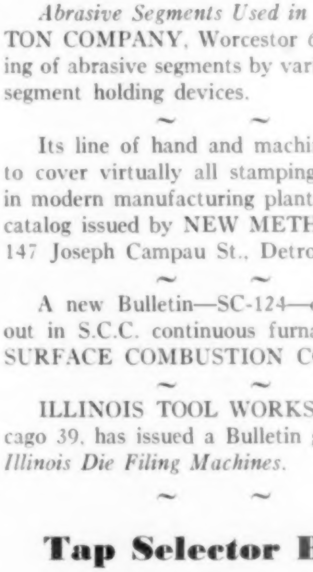
~ ~ ~ ~

ILLINOIS TOOL WORKS, 2501 No. Keeler Ave., Chicago 39, has issued a Bulletin giving detailed information on *Illinois Die Filing Machines.*

~ ~ ~ ~

Tap Selector By Threadwell

A HANDY "slide rule" tap selector that quickly designates the correct tap for a specified class fit is shown in the accompanying photo.



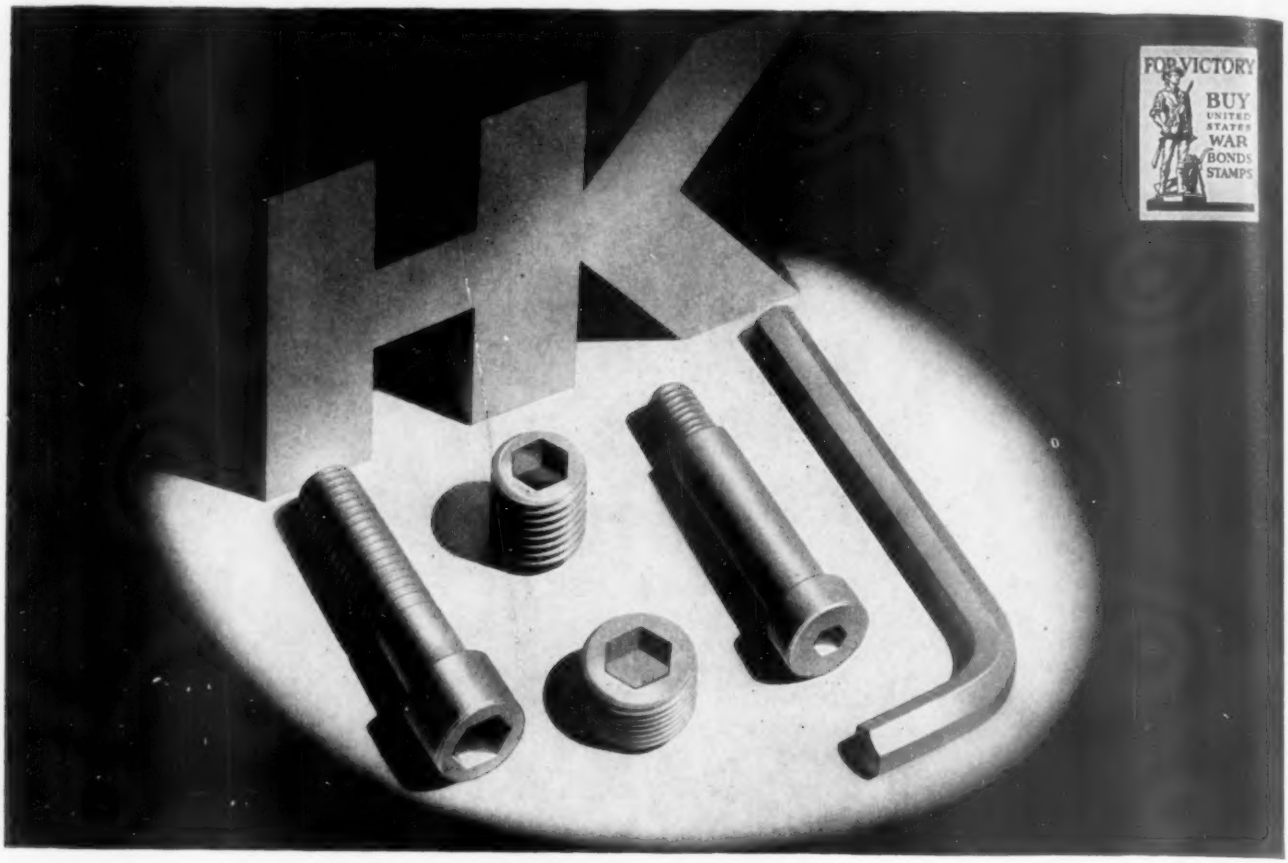
For example, the user may want to tap a ⅜"—16 N.C. hole in cast iron, Class 3 fit. By setting the selector to the tap size, the correct information—that is, that a Class 3 fit requires a precision ground, No. 2 tolerance tap—is shown in the space at the right.

On the other side, he adjusts the slide to the material—cast iron—and reads that he should use a light mineral or soluble oil. He also finds the correct tapping speed for cast iron, which is 70 to 80 ft. per information at a glance. The Selectors may be had, free, from THREADWELL TAP & DIE COMPANY, Greenfield, Mass., by stating name, company position and address, or from local Threadwell distributors.

Index of Tool Engineer Advertisers

August, 1945

THE BETTER FASTENING METHOD

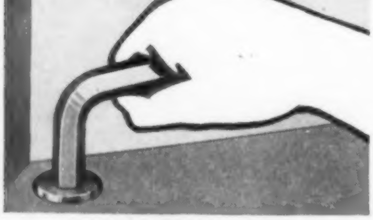


HOLO-KROME

Completely Cold Forged

INTERNAL WRENCHING

QUICK & POSITIVE



TIGHTENING

SOCKET SCREWS

GUARANTEED Unfailing PERFORMANCE

HOLO-KROME

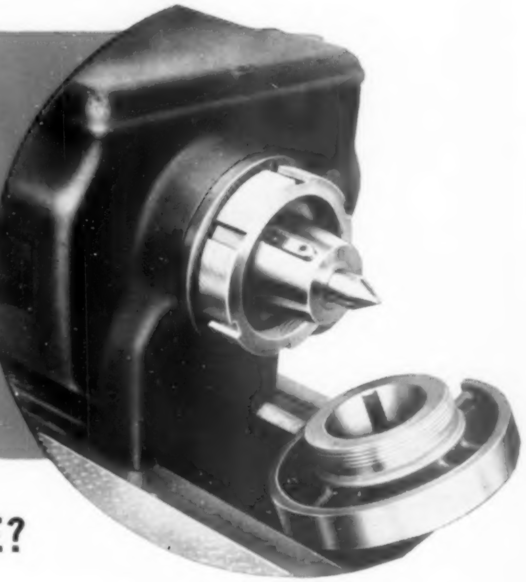
fibro-forged **SOCKET SCREWS**

Manufactured Exclusively by

THE HOLO-KROME SCREW CORP.
HARTFORD 10, CONNECTICUT, U. S. A.

SAVES
WEIGHT—SPACE—TIME

T~~B~~URNING QUESTIONS ANSWERED!



WHY A STANDARD SPINDLE NOSE?

Because it is the easiest, quickest and most positive "on and off" for chucks or face plates. It is particularly appreciated on the big lathes where the large and heavy face plates would present time losing difficulties under other methods. With the LeBlond Standard Spindle Nose, the chuck or face plate is simply lifted to the nose and easily slipped into place. There it stays, perfectly centered and in exact position, leaving both hands of the operator free to tighten the coupling collar. Its Positive Key drive takes all driving and stopping stresses without loss of accuracy. The locking collar insures a lock-tight mounting against the 16.59 degree tapered nose. This taper instantly releases the chuck or face plate when the locking collar is loosened. The Standard Spindle Nose is another of the many LeBlond features ... another reason why men of production specify LeBlond Lathes.

YOURS FOR THE ASKING

Our field engineers are prepared to help you in your development work, particularly along the lines of the difficult, the "out-of-the-ordinary" turning problems. The accumulated knowledge of every manufacturing trend in good times and bad—peace and war—gained over a period of nearly 60 years from thousands of installations all over the world is yours for the asking. Contact our nearest dealer or write Department FE46.

★

SINCE 1887

the world has been turning to LeBlond for turning equipment.

★

WRITE FOR CATALOG!

★ YOUR BONDS BUY BOMBS ★
BUY A "BLOCK-BUSTER" TODAY!

THE R. K. LeBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO, U. S. A.

NEW YORK 6, Singer Bldg., 149 Broadway, WOrth 2-0722
CHICAGO 6, 20 North Wacker Drive, STA 5561

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES